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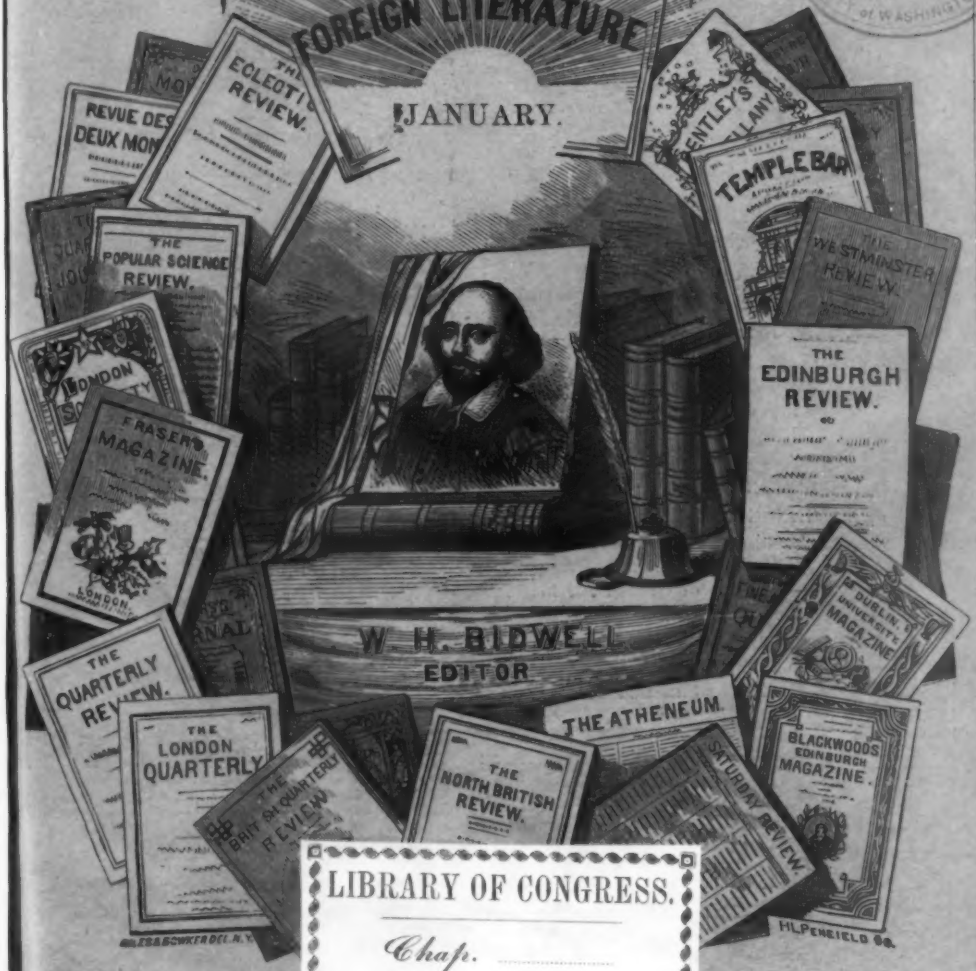

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THE SCIENCE OF ELECTRICITY AS APPLIED IN PEACE AND WAR.*

NOT many years ago, a distinguished member of Parliament was asked to deliver a lecture to his constituents on the subject of Electricity. It was necessary to obtain the sanction of the Mayor for the use of the Town Hall. His worship's ideas of electricity were very limited; indeed, his knowledge of science generally resolved itself into a belief that scientific theories attacked revealed religion. It was impossible to disoblige the borough member, but the permission to use the Town Hall was accompanied by an intimation that although his worship, personally, did not entertain any objection to electricity, he earnestly hoped that the thing would not be carried too far.

Although we by no means consider electricity antagonistic to religion, we have a solid reason for not carrying the thing too far, which is, that we know too little about it. We know that it is present in the heavens above, and in the earth beneath, but in what the subtle element consists we know not. In most branches of physical science we can refer observed phenomena to some ultimate and universal elementary principle. But such is by no means the case with electricity; indeed, Sir William Snow Harris goes so far as to say, that almost every speculation relative to the phenomena of magnetism—and in this we must include electricity—partakes more or less of the nature of a mere hypothetical as-

* 1. *Papers on Electrostatics and Magnetism.* By Sir William Thomson, D.C.L., LL.D., F.R.S., F.R.S.E.

2. *Journal of the Society of Telegraph Engineers.* 5 vols.

3. *Handbook of Practical Telegraphy.* By R. S. Culley.

4. *Report from the Select Committee of the House of Commons on Post Office Telegraph Department,* 1876.

5. *Magnetism.* By Sir W. Snow Harris, F.R.S. 1872.

6. *Der Elektromagnetische Telegraph.* Von Dr. H. Schellen, Director der Realschule Erster Ordnung in Cöln. 1870.

sumption. We have a large collection of observed facts, but with respect to the hidden or efficient cause of the facts, we really have no knowledge whatever. The problem that baffled Benjamin Franklin still defies Sir William Thomson; and the motive force still remains to be determined, of which Faraday said, that he 'once thought he knew something about it, but that the more he investigated it the less he found he understood it.'

The telegraph has taken such a large place in the practical business of life, that the world in general is apt rather to look upon electricity only in light of an agent for rapid communication, than to regard it in its true position as one of the most extensively pervading elements of nature. It is true that the requirements of practical telegraphy have done, and may be expected to do, more than anything else for the science of electrcity and magnetism: accurate measurement of electrical quantities was a condition precedent of any solid improvement, and we owe it mainly to the demands of the telegraph operator that the requirement has been fulfilled. Men of abstract science were satisfied to know that the measurement and definition of electric resistance, electro-motive force, and so on, were within the range of scientific possibility; but the demand for such measurements and definitions was not sufficiently general to make it worth while to invent a compendious method of determining the one and stating the other. We own to Gauss and Weber the first practical realisation of a system of absolute measurement; but the principles laid down by them did not extend rapidly, even among the few by whom their theory was well understood, because there was no urgent need for its practical application.

The use of a definite electrical unit of measurement only became prevalent when it was imperatively required by the daily working of the telegraph. For many years measurements of electrical quantities were habitually performed in the telegraph factory and in the telegraph station-house, at a time when the means of performing them were still generally unknown in the scientific laboratories of Europe. The Professors of Science who threw out the general principle have gained a rich harvest from the seed they sowed: they gave the principle; they got back from the practical telegrapher accurate standards of measurement, and the ready means of transmitting those standards, and of preserving them for years without change; improvements of extreme value to the work of sientific research.

In a science so new and so progressive, the dogma of to-day will often prove to be the exploded fallacy of to-morrow; knowledge is so rapidly accumulated, and so many opposing views have at different times obtained assent, that those who have no special call to follow the progress of discovery hardly know, to use a homely phrase, where they are.

The philosophers of the sixteenth century, not having any definite notion of the phenomena of the compass needle, conceived it to be influenced by some mysterious point of force existing in the regions of space. Descartes and others supposed it to be under the dominion of vast magnetic rocks. Gilbert, taking a bolder view, conceived the terrestrial sphere to be in itself a vast magnet, endowed with permanent polarity and hence approaching the general condition of an ordinary loadstone. The hypothesis of Halley on the subject will be gathered from the mention made of it in the speech of Sir William Thomson quoted below; and the theory remained pretty much where Halley left it till 1811, when the Royal Danish Academy proposed the variation of the needle as the subject for a prize essay, and so induced Professor Hanstein to undertake a re-examination of the whole subject; the result was, in his opinion, to establish the existence of four instead of two magnetic poles. These four poles Hanstein imagined to be of unequal force, and continually shifting their places. Each, he said, has a separate movement and period, and each has a regular oblique-circular motion round the poles of the earth. The stronger North Pole he calculated to perform its cycle in 1740 years, the weaker in 1860 years: the stronger South Pole in 4609 years, and the weaker in 1304 years. We mention this theory principally for the occasion it affords of transcribing, for the benefit of those who are curious in such matters, a note of Sir

William Snow Harris on the remarkable coincidences involved in the numbers deduced by Halley from his researches.*

We pass over the learned investigations of the Rev. Mr. Grover, Professor Barlow, and M. Biot, all of whom are spoken of with respect by Sir William Snow Harris, to come to the theory of Gauss. This accomplished philosopher, whose magnetic researches have become the admiration of Europe, starting from the general principle that magnetism is distributed throughout the mass of the earth in an unknown manner, succeeded in obtaining, partly by theory and partly by adaptation, a sort of empirical formula, which represents in a wonderful way the many complicated phenomena of the magnetic lines, and has thus embodied our knowledge of them in a law mathematically expressed :—

'Gauss's investigation,' we quote from Sir William Snow Harris, 'depends on the development of a peculiar function much employed in physical astronomy. . . . By this process it is demonstrated that, whatever be the law of magnetic distribution, the dip, horizontal direction and intensity at any place on the earth may be computed. Having exhibited his resulting formula in converging series, Gauss determines the declination, inclination, and intensity of ninety-one places on the earth's surface, and which are found to coincide with observation: one great feature, therefore, in this theory of terrestrial magnetism is, that the earth does not contain a single definite magnet, but irregularly-diffused magnetic elements having collectively a distant resemblance to the condition of a common magnet.'

It will be acknowledged that among all these authorities we want a sure guide to lead us by the hand; fortunately we are able to obtain such assistance. Sir William Thomson, the acknowledged chief of living followers of applied science, a short time ago, in delivering the Annual President's Address to the Society of Telegraph Engineers, took occasion to define the present state of our knowledge on the subject of what he called atmospheric electricity :—

'As to terrestrial magnetism, of what its relation may be to perceptible electric manifestations, we at present know nothing. You all know that the earth acts as a great magnet: Dr. Gilbert, of Colchester, made that clear nearly 300 years ago; but how the earth acts as a great magnet, how it is a magnet, whether it is an electric magnet in virtue of currents revolving round under the upper surface, or whether it is a magnet like a mass of steel or loadstone, we do not know. This we do know, that it is a variable magnet, and that there is a motion of the magnetic poles round the axis of figure, in a period of from 900 to 1000 years.

'When the phenomena of terrestrial magnetism were first somewhat accurately observed, about 300 years ago, the needle pointed here in England a little to the east of north. A few years later it pointed due north; then, until about the year 1820, it went to the west of north, and now it is coming back towards the north. . . . Everything goes on as if the earth had a magnetic pole revolving at a distance of about twenty degrees round the true North Pole. . . . About 200 years from now we may expect the magnetic pole to be between England and the North Pole, and in England at that time the needle will point due north, and the dip will be greater than it has been for 1000 years, or will be again for another. That motion of the magnetic pole in a circle round the true North Pole has already, within the period during which accurate measurements have been made, extended to somewhat more than a quarter of the whole revolution. It is one of the greatest mysteries of science, a mystery which I might almost say is to myself a subject of daily contemplation, what can be the cause of the magnetism of the interior of the earth. Rigid magnetisation, like that of the steel or the loadstone, has no quality in itself, in virtue of which we can conceive it to migrate round the magnetised bar. Electric currents afford the more favored hypothesis; they are more mobile. If we can conceive electric currents at all, we may conceive them flitting about. But what sustains electric currents? People sometimes

* 'By a curious coincidence, these periods involve a number, 432, sacred with the Indians, Babylonians, Greeks, and Egyptians, as being dependent on great combinations of natural events: thus the periods 860, 1304, 1740, and 4609, become, by a slight modification, 864, 1296, 1728, 4320, which are not inadmissible, considering the complicated nature of the observations from which the first numbers are derived. Now these numbers are each equal to 432 multiplied by 2, 3, 4, and 10 successively. According to the Brahmin mythology, the world is divided into four periods: the first being 432,000 years; the second, 2 × 432,000; the third, 3 × 432,000 years; the fourth, 10 × 432,000 years. It is also, according to Hanstein, not unworthy of remark, that the sun's mean distance from the earth is 432 half radii of the sun; the moon's mean distance 432 half radii of the moon; but what is more especially striking is the circumstance, that the number, 25,920 (= 432 × 60) is the smallest number divisible at once by all the four periods, and hence the shortest time in which the four poles can accopmlish a cycle. Now this time coincides exactly with the period in which the precession of the equinoxes completes its cycle. Certainly curious and remarkable series of coincidences.'—*Sir Wm. Snow Harris's 'Magnetism,'* p. 17.

say, heedlessly or ignorantly, that thermo-electricity does it. But we have none of the elements of the problem of thermo-electricity in the state of underground temperature which could possibly explain, in accordance with any knowledge we have of thermo-electricity, how currents round the earth could by its means be sustained. And if there were currents round the earth, regulated by some cause so as to give them a definite direction at one time, we are as far as ever from explaining how the channel of these currents could experience that great revolutionary variation which we know it does experience. Thus we have merely a mystery. It is rash even to suggest an explanation. One explanation has been suggested by the great astronomer Halley; that there is nucleus in the interior of the earth, a magnet, not rigidly connected with the upper surface of the earth, but revolving round an axis differing from the axis of rotation of the outer crust, and exhibiting a gradual precessional motion, independent of the precessional motion of the outer rigid crust. I merely say that has been suggested. I do not ask you to judge of its probability: I would not ask myself to judge of its probability. I only say that no other explanation has been suggested.'

This is the latest word on the state of electric science. The ultimate cause is unknown, but two or three things, as appears from this extract, we may allow ourselves confidently to accept. The earth is a great magnet, but how magnetised we do not know. The magnetic poles revolve round the axis of the earth's rotation; but why, we do not know. The probability, as Sir William Thomson thinks, is that the magnetism of the earth is induced, a term we shall have to discuss further on, by atmospheric currents of electricity revolving round it; but why and how they so revolve Sir William evidently considers entirely unproved. He dismisses as untenable the theory of thermo-electricity, first, we believe, started by Sir David Brewster, who imagined * that the magnetism of our globe depended on thermo-electric currents, produced by the heated belt of the equatorial regions and the mass of the Polar ices on either side of it. It is, however, plain that although Sir William Thomson dismisses the thermo-electrical theory as untenable, he considers the magnetism of the earth to be produced by electric currents, circulating around it in virtue of some cause to us as yet unknown.

* Sir William Snow Harris quotes as his authority for Sir D. Brewster's views, 'Edin. Phil. Trans.' vol. ix.

It may be interesting to describe, in confirmation of this view, the ingenious experiments made by Professor Barlow. He wound a copper wire spirally around a hollow globe of wood in such a manner as to make the coils coincide with the parallels of latitude; he then covered the sphere and its spiral wire with the pictured gores of a common globe in such a way as to bring the poles of the electro-magnetic spiral into the same position as the observed terrestrial magnetic poles. The globe, thus arranged, was then placed under a delicately suspended needle, and electro-magnetic currents were caused to circulate through the spiral wire beneath the paper surface. It is a very remarkable fact that the needle so suspended represented on a small scale, under the influence of the spiral currents, all the phenomena of dip and variation exhibited by the compass-needle on the actual globe. Professor Barlow thinks 'that he has proved the existence of a force competent to produce all the phenomena of terrestrial magnetism without the aid of any body commonly called magnetic.' But we will not further weary our readers; they will probably be inclined, in the face of all these varying theories and ingenious experiments, to agree with Sir William Thomson and Sir William Snow Harris, that although we may reason of observed phenomena, the inducing causes of those phenomena remain a mystery of which we know nothing.

If anything can contradict the saying of Solomon that there is nothing new under the sun, it is the recent development of the powers of this mysterious agency. Neither the toying of Greek philosophers with amber, nor the description of the magnet by Lucretius, nor even the alleged knowledge of the mariner's compass by the ancient Chinese, detract from its novelty. The application of electric force to the practical affairs of life belongs to the last forty years. Our old men remember when it took many months to get a letter to India; but the rising generation would think themselves ill-treated if they did not read in the 'Times' each morning the report of any important event which had occurred in India the day before. Electricity rings our bells, lights our shores, runs our errands, and, as we hope, will

blow up our enemies if they approach our coasts. It has become indispensable in peace, and doubly indispensable in war. Last, not least, it has young and vigorous literature, and a special language of its own. It is perhaps owing to the latter circumstance that it is not more generally studied. Its text-books bristle with technical terms completely strange to the uninitiated, and even those terms have not in all cases arrived at their final and definite meaning. Besides this, mathematics have stepped in and claimed it for their own.

> 'The hard-grained Muses of the cube and square,'

as Tennyson calls them, have more and more taken possession of it.

The reasoning of writers on magnetic subjects is now so uniformly conveyed by means of algebraic symbols, that only a skilled mathematician can follow them with comfort. This is doubtless unavoidable in the case of masters dealing with the higher branches of a science that depends on highly abstract reasoning; we do not complain, we only assign the fact, as one cause of the purely esoteric position that electricity is rapidly assuming. We are quite ready to admit the truth of Miss Moucher's remark, that there is a rule of secrets in all trades; the physician's prescription is still written in Latin, and Miss Cornelia Blimber gives her analysis of Little Dombey's character in numbers. We all know how that delightful lady, taking eight as her standard or highest number, found the poor child's natural capacity stated at six and three-fourths; violence, two; and inclination to low company, as evinced in the case of a person named Glubb, originally seven, but since reduced; but notwithstanding these precedents, outsiders like ourselves may be permitted to speculate whether a good deal of information might not be made public property which is now hidden under a heap of symbols.

Whatever we may think of the propriety of always affecting mathematical notation, we have no intention of laughing at the very ingenious nomenclature which has been adopted by the framers of electrical language. It must be confessed that it sounds strange to unaccustomed ears; but we must remember that it was invented to express ideas absolutely new, and that the mind soon becomes used to any word to which definite signification is attached. When electricity passed from the position of a phenomenon to be studied only by philosophers, into that of an agent subservient to the daily wants of man, it was found necessary to invent words and technical terms to express its new conditions. No doubt it is possible, as we propose to show, to express the main facts and even the scientific methods of electricity without employing symbols or unduly parading its scientific terminology; just as a traveller, returning from a distant country, can gossip pleasantly about the wonders he has seen, describe the manners and customs of the people, and even give a very fair idea of their cultivation and modes of thought, without conveying his information in a foreign language.

Still, as we cannot quite keep clear of technicalities, we propose to do the next best thing; namely, to collect them in a couple of preliminary pages, which well-informed people, and very idle people, are hereby solemnly warned to skip.

It is not of course to be supposed that the 'Journals of the Society of Telegraphic Engineers,' and the writings of Sir William Thomson on 'Electrostatics and Magnetism,' the titles of which are at the head of this article, will afford the inquirer much information of an elementary character. Written by professed masters of the science and addressed to a professional audience, these works presuppose a kind of information which the generality of people are not likely to possess. But if we succeed, as we hope to do, in giving such a general outline as will supply this defect, our readers will find in the 'Journal' a mine of interesting information. The Society from which it emanates is only in the seventh year of its existence; but it has already assumed a leading position among learned societies, and it numbers among its members most of those who, either in this country or on the Continent, have devoted themselves to electrical science. The papers it contains, written and read from time to time by busy men on subjects arising in the daily exercise of their calling, are of course desultory, but it will be found

that few improvements worthy of remark have escaped notice; and the progress of telegraph work all over the world has provided a body of skilled and able observers, whose collective watchfulness will no doubt soon raise the new science from the somewhat empirical position it has hitherto occupied, and enable it to rank with the more exact branches of physical research. The daily experience of telegraphic operators, constantly noting new electrical phenomena, and with busy brains puzzling out their cause, ranges of course far beyond the comparatively narrow domain of mere telegraphy, and the labors of the leading telegraphists have gone far to build up a tenable theory of electricity; but, as we have seen, their acknowledged leader, Sir William Thomson, is fain to confess that the desired object is not yet by any means attained. Sir William's own papers on 'Electrostatics and Magnetism' are marvels of industry and patient research. But it must be confessed that they are 'caviare to the general.' The titles of them alone would be enough for most people. For instance, one that we transcribe almost at random from his table of contents, on 'Hydrokinetic Analogy for the Magnetic Influence of an Ideal extreme Diamagnetic,' sounds anything but light reading. Fortunately we are not obliged to invade this part of the learned Professor's domain; we consult him principally for his opinions on the general magnetic condition of the earth, and for occasional dicta on subjects which he is acknowledged to have made especially his own.

It is hardly necessary to remark that to voltaic or current electricity, and to its congener electro-magnetism, all modern improvements are due. Frictional electricity, such as was known to Franklin, and to observers before the time of Galvani, though it is a manifestation of the same force which now works our telegraphs and explodes our torpedoes, so far differs from it in kind that it could never have been utilised in the everyday business of life. In modern electrical parlance, frictional electricity was high in tension and deficient in quantity; it could break with ease through the opposition of a non-conductor which would stop the feebler current of an ordinary galvanic battery, but its energy was exhausted by the effort of a single discharge. There was a spark; a crack; a shock if any sentient being was in the circuit—and then all was at rest. There was no means of obtaining a continuous current such as that we now command at will. A modern battery combines both requirements, it will keep up a continuous stream of electricity through a long circuit, for days and even for months together. It can, on the other hand, be so arranged as to deliver a flash, of power so tremendous, that it would penetrate thick glass, or leap from pole to pole of conductors held a yard apart. It is this manageable nature of the agent which gives it all its value.

The discovery of current electricity was the result of pure accident. The wife of the Professor of Anatomy at Bologna being indisposed, her physician prescribed a broth of frogs. It would seem that the Professor's domestic and professorial arrangements were carried on in the same apartment, for the frogs destined for the lady's refreshment were laid out, properly prepared for cooking, on the table where the Professor was engaged with his electrical machine. With true scientific curiosity, Galvani tried a few experiments with the animals before they were consigned to the pot. A spark from the conductor caused their limbs to contract: struck by a phenomenon new to his experience, he determined to follow it up, and devoted himself to experiments on the electricity of animals with such zeal, that he became the terror of every pond near Bologna. He one day hung a dead frog by a copper hook to the iron balcony of his window. The limbs of the animal became convulsed, and the Professor, unable to account for the phenomenon, took refuge in the hypothesis of what he called animal electricity, supposing opposite kinds of electricity to exist in the muscles and nerves.

This theory Galvani supported till his death with great ingenuity and determination; but a rival philosopher, Volta, Professor of Physics at Pavia, started a new view. He contended that the two metals, copper and iron, in the experiment of Galvani, were the real electromotors, and that the muscles of the dead frog only played the part of moist conductors in completing the circuit.

This was vigorously opposed by the partisans of Galvani, and a scientific war of opinion waged for many years between the schools of Bologna and Pavia, out of which Volta ultimately came victorious. Volta, in the course of a series of experiments, in which he tried to produce effects similar to those witnessed by Galvani, substituted other substances for the animal tissues, which Galvani regarded as essential, and discovered the means of producing a continuous current, which is called after him, Voltaic Electricity. Although Volta was right in his main contention, he had only advanced one step beyond Galvani, when he, too, fell into error. It was his opinion that the simple contact of two dissimilar metals was sufficient to produce an electric current; but the theory now generally adopted is that first suggested by Fabroni, which regards chemical decomposition as necessary to the development of the voltaic current. The contact theory of Volta assumes that the origin of the action is due to the simple contact of two dissimilar metals, and that the mere juxtaposition of these begets and sustains a force which is the sole cause of all the energy displayed. But Volta, and all those who afterwards supported him in his view, were ignorant of dynamics. They did not know that the quantity of energy in the universe is constant, that to create *de novo* the smallest fraction of it is as far beyond the power of man as it would be to add one grain of matter to that which is already in existence. All that man can do is to alter the direction of existing energy, but in whatever form it is made to appear it is but the equivalent of some pre-existent form, which, Proteus-like, is driven to assume an altered shape. It is now thoroughly understood that in a zinc-copper battery the decomposition of the zinc is a condition necessarily precedent to the production of a current.

It has been customary to speak of electricity as if it had a distinct existence, and were an extremely subtle fluid capable of flowing as a current. The theory of Symner, as this hypothesis is called, however convenient for the purpose of simplifying explanation, must not be looked upon as scientifically tenable. Symner assumes that every substance in nature contains an indefinite quantity of an imponderable matter formed by the union of the two fluids, to which the names of positive and negative electricity have been given. These two fluids when in combination neutralise each other, and the body containing them is then said to be in the neutral or natural state. By friction, and by several other means, the two fluids may be separated; but one of them cannot be produced without the simultaneous production of the other. Such is the theory; but, however convenient it may be for the purpose of reasoning about a purely abstract idea in the common language of life, it contains fundamental errors. There is no fluid, properly so called; the agency exists only as a force. Its subdivision, then, into mutually opposing fluids also falls to the ground. Sir William Thomson says that, although according to previous writers, 'a hypothesis of two magnetic fluids has been adopted, no physical evidence can be adduced in favor of such a hypothesis, but, on the contrary, recent discoveries, especially in electro-magnetism, render it extremely improbable.' *

The term 'electric fluid' must be looked on as purely conventional; electricity must be conceived of as a force, pervading all nature, latent in every substance, and liable at any moment to be excited by mechanical or chemical means. This force obeys certain laws, and acts in a particular manner; but the terms 'fluid' and 'current' do not accurately represent its action, inasmuch as it does not flow bodily from place to place, as a current would do, but follows rather the analogy of the undulations of light or the waves of sound. This, however, is of little practical importance; it is enough for our present purpose that the earth is an inexhaustible reservoir of electricity, and that it is possible to separate a portion of that electricity from the main body. The portion so separated will struggle to escape and recombine, and the energy it thus exerts can be utilised for the purposes of work. In forcing its way through or over obstacles, electricity exerts force which may be directed, utilised, and measured.

Force may be exerted either to produce motion in bodies at rest, or to op-

* 'Electrostatics and Magnetism,' p. 340.

pose resistance to the motion of moving bodies. In either case it will do a definite amount of work, and that amount of work can be compared with a standard. The first step, then, was to contrive a standard, by which electrical energy might be measured, and in terms of which it could be expressed. In mechanics, a force sufficient to raise one pound to the height of one foot, affords such a standard, for it is practically invariable. This would be too rough for the measurement of electrical force, which is minute in quantity; but one analogous in conception has been adopted: namely, a force which will lift one gramme to the height of one metre, in one second of time; this standard force has been named an 'absolute unit.' In measuring a force it is not necessary to inquire whether it is employed in promoting motion or in resisting it; so that the strength of a current, the resistance offered by a wire to the passage of a current, the quantity of electricity passing through a given circuit, and the capacity for electrification of a given condenser, can all be expressed in the terms of the absolute unit.

The next step was to invent and give a name to some measure which should be an accurate multiple of the absolute unit. A man calling for a pint of wine does not calculate the cubic contents of his bottle; he compares the quantity he buys with a standard pint: and if he buys a cask, he ascertains that it contains a certain number of standard quarts. In the same way electricians have given to their standard measure, and to its derivatives, names which sound very strange to unaccustomed ears, though they fulfil very well the objects for which they were designed, being short, striking in sound, easy to remember, and significant.

The whole of this useful labor was performed by a Committee of the British Association, which was appointed some years ago, and comprised most of the principal electricians of the country; their report has been adopted both in England and abroad. They found that a prism of pure mercury, one square millimetre in section, and 1.0486 metre in length, at a temperature of 0° centigrade, offered a resistance to the passage of a current equal to ten millions of absolute electric magnetic units. This measure they called a 'British Association unit,' or shortly, a 'B. A.' unit. This designation has now been practically superseded by an arbitrary name; it is called after a great electrician, an 'Ohm.' Certified copies of this standard, consisting of coils of platinum silver-wire, each of which oppose to an electric current a resistance equal to a given number of Ohms, are now everywhere obtainable. They are known by the name of resistance-coils, and are marked with the number of 'Ohms' resistance which they offer. They are conveniently arranged in boxes, and so connected that a current can be easily passed through any required resistance; and at the present time all electrical resistances are as habitually measured in 'Ohms,' as liquids are by the pint, or ribbons by the yard.

Force being imponderable, we can measure and weigh only the work which it performs; the names of weights and measures employed in electrical science are coined out of the patronymics of those who have been distinguished in electrical science. Faraday gives his name to the unit of capacity, under the name of a 'Farad;' Volta impresses his name on the unit of tension, under the name of a 'Volt.' The unit of current is called of the Professor of that name, a 'Veber.' The unit of resistance, as we have said, is an 'Ohm.' These designations are further compounded with Greek adjectives, a 'macrofarad' is a million times, and a 'microfarad,' the thousandth part of a 'Farad.' A 'megohm' is a million Ohms, a 'megaveber,' a million Vebers, and so on.

We need, however, trouble ourselves very little with the greater part of these names; the reader who will take the trouble to remember that the 'Ohm' is the standard measure of electricity, and who will glance at the explanation of some half-dozen electrical terms which we now proceed to describe, may consider himself free of the guild as far as the purposes of this paper are concerned.

The first, and perhaps the most important of these terms is the word 'potential;' to say the truth, the text-books are curiously puzzling in their attempts to explain it. The matter is, however, very simple. If two electric batteries,

or other sources of electricity, A and B, are of different electrical strength, there will be a tendency in the electricity at the point most highly electrified, to combine with that at the point of lowest electrification.

If A were electrified twenty times as strongly as B, the potential of A would be said to bear to the potential of B the proportion of twenty to one, and the greater the difference of potential the more strenuous becomes the effort of the electricity to re-combine. It would force its way at once from one point to the other, were it not that air is a non-conductor, and electricity requires a prepared path or conductor to travel over. If the two points be brought close together, before they actually touch, a spark will overcome the resistance of the intervening air, and spring from one to the other; but if, instead of approaching the two points to each other, the distance between them is bridged over by a conductor, the same thing will occur; the only difference will be that, supposing the electromotive force to be constant, in the first case there will be a succession of sparks, and in the second a continuous current. It matters not whether the distance to be overcome be traversed by the leap of a spark across half an inch of air, or by the passage of a current along a thousand miles of telegraph; the cause is in each instance the same, namely, difference of potential between the two poles. This is an axiom of fundamental importance. The anxiety of electricity to re-combine is called its 'tension,' and the degree of tension existing on any substance is spoken of as the potential of that substance.

Very often by atmospheric agency, or by some other of the many means which nature employs in such cases, a difference occurs in the electrical potential of the earth at two places on its surface, say at New York and in London, and the result is an earth current passing from one to the other, very much, as we shall presently see, to the embarrassment of telegraph-working between those two localities.

Our next definition must be the meaning of electrical *resistance*. Every substance can be electrified; some very easily, and some with great difficulty. For instance, the metals, with German silver and copper at their head, can be electrified almost instantaneously. Other substances, such as glass, carbon, shellac, or gutta-percha, take a very long time, and very strong and persistent electric excitation to become so. Those substances which are quickly electrified are roughly, but not very accurately known as conductors; and those over which electricity moves slowly, are, with equal inaccuracy, called insulators. It is all a question of degree; the best conductor offers a certain amount of retardation, or, in electrical language, resistance, to the march of the fluid; and the worst conductor known is permeable in time, and does not afford perfect insulation. To be sure, electricity moves along a copper wire at the rate of 288,000 miles a second, and it would take a very long time to creep over a few inches of gutta-percha; but as a mathematical fact, neither insulators nor conductors are perfect. If we take 100 as the standard of conductivity, or absolute non-resistance, pure copper wire would show, perhaps, ·95 or ·96 of conductivity, and consequently ·05 or ·04 (the reciprocals of those numbers) of resistance. Gutta-percha, at the other end of the scale, would perhaps show ·01, or perhaps not nearly so much, of conductivity, and ·99 of resistance. A mathematical formula, discovered by Ohm, states electrical resistance to be inversely proportional to the strength of the current.* We see the result of this in the case of a lightning conductor. A small copper wire would carry away a moderate current without disturbance; the current and the resistance of the wire would have some [manageable relation to each other; but a flash of lightning discharged along the same wire would be so intense that it would fuse the wire. The resistance would be the same, but the proportion would be destroyed by enormously multiplying the strength of the current.

On the same principle, a piece of carbon introduced into a circuit would stop the passage of a feeble current, being a bad conductor; it would, however, let a stronger current pass, but before doing so it would offer such a vigorous resist-

* $I = \frac{E}{R}$ where I is the intensity of the current, E the electromotive force, and R the resistance.

ance, that the energy necessary to overcome it would develop caloric sufficient to heat the carbon white hot. This is the principle of the electric light. The reader will now, we hope, follow us when we speak of the resistance of a wire, a battery, or an electric circuit of any kind.

We now come to electrical *induction*. This curious property of electricity exercises a most important and sometimes a very unmanageable influence, in practical work. Indeed, it would hardly be too much to say that it thrusts itself into every problem which arises for solution. Sometimes it is utilised to the greatest advantage, as when it is applied to the purpose of storing up electricity ready for future service in condensers or accumulators; sometimes, as in the case of the well-known Ruhmkorff coil, it is invaluable in producing secondary currents even more useful than the direct products of the battery. Sometimes it presents itself in a less manageable form, as an influence retarding, and nearly destroying, the transmitted currents in submarine cables; but in whatever form it appears, whether as ally or as opponent, it plays a most important part.

Electrical induction may be defined as the mutual effect of electrified conductors in presence of each other, but separated by a non-conductor. The phenomenon may be produced in its simplest form by fixing two pieces of tinfoil, facing each other, one on each side of a sheet of glass. If the tinfoil on one side of the glass be connected with the earth by a wire, and the tinfoil of the other side be connected with a battery or electrical machine, electricity will be simultaneously produced on both sides of the glass, and the two electricities so produced will hold each other prisoners by their mutual attraction through the glass, till one or other of them is discharged, or till they are allowed to unite by means of a conductor. This 'holding' power is utilised in the shape of instruments known as 'condensers,' for the purpose of storing electricity.

A large number of sheets of conducting material, such as tinfoil, each separated from its neighbor by a non-conductor, for instance, paraffined paper or sheets of mica, are bound up together; when in use one of each pair of conductors is connected with earth, and the other with a battery; a number of such pairs, packed in convenient form, and connected together in series, may store up any required amount of electricity for the purposes of experiment or work.* Condensers are now sold with their 'capacity' in 'Farads' marked upon them.

Like most of the discoveries which have made the progressive development of electrical science possible, the invention of the Leyden jar, as the earliest and best known form of condenser is called, was the result of a lucky accident. It dates from the last century. Most amusing accounts are given of the dismay with which the discoverer looked upon its effects. Professor Muschenbroek, it seems, had been thwarted in some of his experiments by the escape of electricity into the air. This he attributed to the vapors and effluvia suspended therein. It occurred to him that if he could electrify water in a glass bottle, the dissipation of the mysterious fluid might possibly be prevented. He accordingly half-filled a bottle with water, and proceeded to electrify it from a battery. When he considered the water sufficiently charged for his purpose, he attempted to remove the connecting wire with his left hand, holding the bottle in his right. He received a shock which terrified him beyond measure. He wrote to his friend Réaumur that he had received a blow on his arms, shoulders, and breast; that he lost his breath, and was two days before he recovered from the shock and the terror. In Muschenbroek's experiment the water acted as the inner coating, the glass, as usual, was the dielectric, the Professor's right hand, as he held the bottle, was the outside coating, and the left, when he innocently touched the wire, completed the circuit, and discharged the stored-up fluid through his body.

Modern Leyden jars are glass vessels coated inside and out with tinfoil. Muschenbroek wrote to his friend Réaumur that for all the kingdom of France he would not receive another shock; but he was sufficiently public-spirited to try the experiment on his friends; they

* The electricities will be of opposite name, that is, if the battery current be positive the induced current will be negative, and *vice versa*.

were almost as alarmed as himself. M. Lallamand, on taking a shock, declared that he lost the use of his breath for some minutes, and then felt so intense a pain along his right arm that he feared permanent injury to it. Herr Winkler stated that the first time he underwent the experiment he suffered great convulsions through his body; that it put his blood into agitation; that he feared an ardent fever, and was obliged to have recourse to cooling medicine. This Professor was a very bold man. He administered the shock to his wife, and it made her nose bleed. From all which we learn that either the electrical machine, or the imagination, of Professor Muschenbroek, possessed a strength unattainable in these degenerate days.

A curious, and to practical telegraphers a very inconvenient, development of the phenomenon of induction is offered in the case of submarine cables, by the retardation of signals. A telegraph cable is, as one may easily see, only an elongated condenser; the copper-wire of which, representing the inner coating, is separated from the outer coating of water and earth in which it is laid by its gutta-percha insulator. It is obvious that two or three thousand miles of wire present collectively an enormous inductive surface; indeed, Sir W. Thomson tells us that, if it were possible from some extraneous source to give a charge of electricity to the whole earth, no greater amount would be necessary for that purpose than is held prisoner by a few miles of cable.* The holding power of the wire when fully charged is very great; so great, that a current, instead of flowing through the cable with the rapidity of light, follows, one may almost say, the analogy of a viscous fluid, and dribbles through with comparative slowness.

On submarine telegraph cables messages are transmitted at the rate of fifteen or twenty words a minute, whereas, if the effect of induction could be removed, three or four hundred words per minute might be sent. The current has been experimentally found to move through the Atlantic cables at the rate of 6125 miles per second—an enormous velocity, of course—but nothing like the pace of the fluid in overhead insulated wires. The speed of electricity under the latter circumstances was found by Sir Charles Wheatstone to equal 288,000 miles per second. This enormous speed, forty-five or forty-six times as great as the velocity of the current through a submarine cable, was ascertained in a manner which has since become the standard method of measuring enormous velocities and infinitesimal fractions of time. Wheatstone suspended around the walls of his lecture-room at King's College about four miles of wire. On his table he placed a little instrument which he called a spark-board, and before the spark-board he made a circular mirror rotate at the rate of 800 turns per second. The wire was so arranged that its two ends were connected one with the outer and one with the inner covering of a charged Leyden jar. When the jar was discharged, the spark traversed the whole length of the wire. But in the wire were three breaks. The first occurred at the spark-board, soon after the wire left the jar, the second at the end of two miles of wire, and a third just before the wire returned to the jar. All these openings were so arranged as to occur at the spark-board. The current of the jar at the moment of discharge was thus made to show itself in the form of a spark three times, as it overleapt the three intervals; these were reflected in the mirror. When the mirror was at rest, the sparks showed only as three dots; but when the mirror was made to revolve very rapidly, the dots changed into lines of light, the length of which varied with the rapidity of the revolution of the mirror. By measuring the length of these lines and the rate of rotation of the mirror, and noting how much the central line lagged behind the others, Wheatstone was able to calculate how long the spark took to traverse the intervening wires. This experiment gave, as we said above, 288,000 miles per second for the velocity of the spark.

One of the exemplifications of induc-

* 'Journ. Soc. Tel. Eng.' No. vii. p. 12. 'Such amounts as we deal with in our great submarine cables would, if given to the earth as a whole, produce a very considerable electrification of its whole surface. The earth's radius is about 630 million centimetres, and its electrostatic capacity is therefore 630 million microfarads, or about that of 1600 miles of cable.'

tion most familiar to our senses, is a thunderstorm. Here, again, the analogy of the Leyden jar comes into play; the earth, highly charged with electricity, is separated by a non-conducting stratum of air from the thunder-cloud, also charged to a high potential. The two electricities, that in the earth and that in the cloud, hold each other prisoners by their mutual attraction, and, as the charge on each continues to accumulate, the particles of intervening air are raised to such a high degree of polarisation that they fall into a state which is described as of 'tottering equilibrium;' the slightest change destroys this condition, and electric discharge follows with all the effect of light, heat and mechanical energy.

An electrified cloud decomposes the combined electricity of every object over which it passes, repels the electricity of the same kind as that contained in itself, and attracts the opposite kind. The earth and objects beneath an electrified cloud are in this manner charged by induction. When the attraction between the opposite kinds of electricity becomes greater than the resistance of the intervening air, a discharge takes place. It is the accumulation of induced electricity on buildings, which offers the attraction for the opposite electricity contained in the electrified cloud, and causes them to be struck by lightning. The flash will pass along the line of least resistance at the moment when earth and air can bear the mutual tension no longer. Any accidental object may turn the scale. As Mr. Preece puts it, a ship sailing calmly over the ocean, a moving railway train, a horseman galloping home for shelter from the approaching storm, may be the last straw that breaks the camel's back.

Every one knows the celebrated experiment of Franklin, by which he demonstrated the identity of electricity with lightning.

Franklin, when he sent up his kite, fastened a key to the string, and to the key a silk ribbon, intended (silk being a non-conductor) to isolate him from danger. For some time he was unable to perceive any appearance which would justify his theory; but a shower came on, the kite-string was wetted, and therefore became a good conductor. Franklin, in his impatience, presented his knuckle to the key, and was gratified by receiving a smart shock. It was lucky for him that his success was not more complete than it proved to be, for he would have paid dearly for the honor of his discovery.

He thought that his kite had withdrawn electricity from the thunder-cloud, whereas the discharge he witnessed depended on the inductive action of the thunder-cloud on the kite and string; he escaped destruction, because the electrity with which his kite and its string were charged was the small amount induced on them by the thunder-cloud.

Philosophers who followed in his footsteps did not escape so easily. Professor Richmann, of St. Petersburg, was killed by lightning in the following year. He had erected an apparatus in the air, making a metallic communication between it and his study, where he had provided means for repeating Franklin's experiments. He was describing to his friend, Sokoloff, the nature of the apparatus, and was stooping towards the electrometer to observe the force of the electricity, when a great white and bluish fire appeared between the rod of the electrometer and his head; at the same time a sort of steam or vapor arose, which entirely benumbed Sokoloff and made him fall to the ground. Several parts of the apparatus were broken and scattered about, the doors of the room were torn from their hinges, and the house shaken in every part. The wife of the Professor, alarmed by the shock, ran into the room, and found her husband sitting on a chest, which happened to be behind him when he was struck, and leaning against the wall. He appeared to have been instantly struck dead; a red spot was found on his forehead, his shoe was burst open, and a part of his waistcoat singed.

This dreadful accident was caused by the neglect on the part of Richmann to provide an arrangement by which the apparatus, when too strongly electrified, might discharge itself into the earth. If in Franklin's experiment lightning had really passed from the clouds to the earth, he would infallibly in like manner have been killed. People are very little wiser than they were in Franklin's time. At a recent meeting of the Society of

Telegraph Engineers, Mr. Preece, one of our most distinguished electricians, spoke as follows :—

'When I go into the country towns or places, and have a few minutes to spare, I invariably go to the church, not only to admire the architecture, but especially to see what sort of lightning protection it is furnished with; and I am bound to say this: I have never been to one church yet where the lightning-conductor comes up to my notion of what a lightning protector should be. . . . Sometimes it has no point and even no earth. Generally it is made of the most expensive copper rod; sometimes of the most inefficient iron tubes, broken in the middle; but in my experience of hundreds of churches, I have never seen one single lightning-conductor that I would pass as a lightning-conductor.'

Now, considering the professional eminence of the speaker, and the fact that his remarks refer to no remote date, but were spoken on the 12th of May, 1875, it behoves us all to look to our defences. It seems almost incredible, yet we believe it to be the fact, that St. Paul's Cathedral, situated as it is in the heart of the City of London, was, until very lately, in an electrical sense, totally unprotected. During all the years since first it raised its golden crown over the murky atmosphere of Cheapside, until the year 1872, it was in such a condition that a single one of the thousand storms that must have played around it might have crumbled it to the dust. At its summit, on the exterior, there is a mass of metal weighing many tons, all of which was electrically insulated. The reverse, of course, should have been the case. The whole of these—cross, scrolls, and ball, should have been connected by some good conductor with the earth. Beneath the cross, and immediately below the great leaden dome, is a gallery of massive iron-work; still lower are the immense lead-covered surfaces of the aisle-roofs. All these were found to be so completely insulated, that if insulation had been an object to be attained by the utmost possible exercise of scientific ingenuity, it could hardly have been more effectually accomplished.* The lightning should by rights have found no resistance in its passage to the earth, whereas the resistance opposed to its course was nearly infinitely great.

'Inside the building,' said the same writer, 'we had, to tempt the lightning, the iron stanchions of the scrolls and ball; and around the whispering gallery were the immense iron gas-mains which supply the ring of jets immediately beneath the gallery. The sections of these mains are insulated from each other by the packing of the joints, and so are the successive sections descending the main shafts to the bottom of the building.'

The writer goes on to show how the conductors originally put up to protect the building had been in the course of years eaten entirely away by rust, so as to afford great gaps which would have to be overleaped by the lightning, and so far no doubt the appointed means of safety entirely failed; but the sentence quoted above appears to us rather to indicate a source of safety than of danger. We cannot help thinking that the immunity enjoyed by the building for so many years was probably due in a great measure to the accidental circumstance of the iron-work of the whispering-gallery being connected, by means of the gas-pipes, with the enormous area of iron sewer-pipes of subterranean London. The writer of the account seems, however, from other parts of his article, to be so much the master of his subject, that we hardly think the sentence we quote was meant to imply exactly what the words appear to convey, for he could not have intended to say that the connection of the gas-mains with the whispering-gallery was otherwise than a means of safety. Another expression in the sentence appears to point to adhesion on the part of the writer to a popular fallacy. The idea that metal 'tempts the lightning' is unsupported by any fact, and is at variance with the whole course of experience. Lightning-rods do not attract lightning. Lightning is atmospheric electricity moving through bad conducting matter in an explosive form; metals are good conductors, and therefore the course of the flash will, in nine cases out of ten, pass along metals, because from their conducting properties they form part of the line of least resistance. But it cannot be supposed that an agency, which moves with such terrible velocity and irresistible force as lightning, could be arrested in its onward course and drawn aside by an insignificant piece of metal in the form of a lightning-rod. If

* See an article in the 'Telegraphic Journal,' August 1st, 1873, on the subject.

metal did really possess the power of attracting lightning, the use of metallic eave-troughs, gas-pipes, water-pipes, speaking-tubes, bell-wires, and the thousand and one adaptations of metal in use in buildings, ought at once to be discontinued.

But this is not the case. So far from lightning-rods attracting lightning, an ideally perfect series of lightning-conductors would prevent the possibility of any disruptive charge within the limits of the action. The effect of lightning-rods is due to the fact that large quantities of electricity pressing upon small surfaces become quite unruly; and when the surface is reduced, as in the case of a lightning-rod, to a mere point, it gives rise to an escaping current and causes the electricity with which it is charged to diffuse itself in the air, much as a stream of water would do through the nozzle of a garden-hose. Points do not receive electricity from bodies with which they are not in contact; except in case of disruptive discharge, the silent flow is always from points, never towards them.

A good lightning-conductor offers a peaceful means of communication between the earth and the clouds; it leads the terrestrial electricity gently up into the sky and allows it to combine with its opposite without disturbance; but if the tension is too great to be thus quietly disposed of, the flash strikes downwards, and is led harmlessly to the earth by the conductor. A well-constructed conductor is uninjured by the flash, because it offers but small resistance. But if in any part of the circuit between the electrified cloud and the earth there is an interval of badly conducting material, or if there is any break in the continuity of the conductor, the lightning will leap over, rend, and shiver to atoms anything that opposes its passage.

Owing to the affinity of electricity for points, when an electrified cloud passes over a building electricity will accumulate with most intensity upon ridges, gables, and finials; for this reason all such objects should be connected with the lightning-rod, and the rod itself should be fastened to the walls, instead of being, as is too often the case, insulated from them by glass. In short, the great object is to present such a number of points to the electrified cloud as to neutralise it, and prevent the necessity of disruptive discharge; if, after all, an explosion should ensue, the lightning-rod will form the line of least resistance, and afford the means of harmless escape to the earth. A good lightning-conductor should have a sharp point, be continuous without fracture throughout, and have its end buried deeply in moist earth. In fixing a conductor, a hole should be dug deep enough to reach earth permanently moist, or, failing the possibility of this, it should be fixed to a considerable quantity of old iron, or an iron drain-pipe. But this is a much less desirable plan. It is very commonly the custom to lead the end of the conductor into a tank. For purposes of safety it might as well be attached to the iron-work of the proprietor's bed. If the tank is full of water, the cement, preventing percolation through its sides and bottom, would to a great extent insulate the earth-connection; if the tank is dry, the conditions are still worse, for there is then no 'earth,' in an electrical sense, at all. We are told of one instance in which a gentleman coiled up the end of his lightning-rod, and put it into a bucket in his cellar, apparently under the impression that the water would extinguish the lightning. Another point to be noted is, that galvanised-iron rope forms as efficient a conductor as the expensive bar of copper which tradesmen usually recommend. 'Remain indoors during thunderstorms,' says a writer on this subject, 'keep out of cellars, and avoid being near trees during the passage of electrified clouds. In case the gas or water-pipes of the buildings are not connected with the lightning-rods, it is not safe for a person to remain in a position in which his body would become part of the line of least resistance between them. Beds should be removed from the walls. Persons in chairs should be in the centre of the room and keep their feet off the floor.' We imagine, however, that only very nervous persons will think it necessary to obey all these instructions to the letter.

If a discharge from an electrified cloud takes place from any cause whatever, at any point, the cloud is left in a neutral condition. Induction ceases, and all the bodies charged by induction instantly return to a neutral state. The

suddenness of this return constitutes the dreaded 'return stroke,' which often destroys buildings and animal life at a great distance from the place where the direct charge takes place, and is more often fatal than the direct discharge. A curious circumstance, which was the subject of discussion at one of the meetings of the Telegraph Engineers, affords an apt illustration of this. A gentleman named Pidgeon, with his wife and son, were on the grass-plat of their house at Torbay close to the sea-shore, when a violent and sudden thunderstorm destroyed the flagstaff near which they were standing, and inflicted injuries more or less severe on all three of them. As many of the principal English electricians took part in the discussion which followed the reading of the account, and it seemed to be pretty generally the opinion of the authorities that the effects on Mr. and Mrs. Pidgeon were due to the return stroke, we will tell the story.

Mr. Pidgeon and his family were looking out to sea, and watching an approaching thunder-cloud. Suddenly, with a crash that was compared by bystanders to the explosion of a 300-pounder gun, the lightning broke over the mast, which was shivered to atoms. Fragments of it were forced 150 yards to windward, showing that great mechanical force must have been developed at the time of the discharge. Of the effects on themselves, we must allow Mr. Pidgeon to speak. We extract from a letter written by him to 'Nature,' and reprinted in the 'Journal':—

'Of the three, my wife only was "struck," and fell to the ground, my son and myself remaining erect, and all three lost consciousness. For more than half an hour my wife lost the use of her lower limbs and left hand, both of which became rigid. From the feet to the knees she was splashed with rose-colored tree-like marks, branching upwards, while a large tree-like mark, with six principal branches diverging from a common centre, 13 inches in its largest diameter, and bright rose-red, covered the body. I had almost forgotten to mention that my wife had just closed the lower door leading from the garden to the shore, and was looking over it out to sea. The iron bolt which fastens this door is *exactly* the same height from the ground-line as the mark on my wife's body . . . As I turned to help my wife, who was on the ground, I shouted, as I thought, that I was unhurt; but it seems that I only uttered inarticulate sounds, and my son in his first attempt to answer did the same.'

It was very truly remarked on the account, of which the above is a brief extract, that if the Pidgeon family had been struck by lightning they would not have been there to tell the tale. The probability was that they, as well as the flagstaff, were strongly charged with induced electricity by the advancing cloud. When it reached the flagstaff—and, coming from the sea, the flagstaff is the first object it would encounter—a discharge took place, and Mr. Pidgeon and companions returned to the 'neutral' state so rapidly as to cause severe inconvenience. In the 'Telegraphic Journal' is published a drawing which is described as a 'Facsimile of chief marks made by the discharge on Mrs. Pidgeon,' but on the subject of its exact resemblance we have no certain information. We should have thought that printers' ink could hardly produce a facsimile of a rose-red object. But we must not allow imagination to carry us too far. We content ourselves with the remark that the design is remarkably elegant.

Of all the recent developments of electricity, the submarine cable has, perhaps, exercised the greatest effect on modern life. Its history and mode of manufacture have been in recent years so much before the public, that most people have accurate general ideas on both these subjects. But there are a few points connected with the working and maintenance of sub-oceanic cables, on which information is not so readily attainable. For instance, it is curious how little is known of gutta-percha. This substance, which is the dielectric in most ordinary use for separating the conducting wire of submarine cables from the ocean-bed on which it is destined to repose, is the concrete juice of the *Isonandra gutta*, or Taban-tree. It grows to a height of sixty or seventy feet, in alluvial soils, at the foot of hills in the Malayan Archipelago, in Southern Asia, and in Dutch Guiana. The chief supply has hitherto been obtained from Singapore. We are told by Mr. Douglas, that the words gutta percha are Malayan; the former signifies gum or concrete juice of a plant, the latter the special tree.

When first this substance was introduced into England, and before the manufacture of telegraph cables made it

an article of such primary necessity as to require economy in its use, it was the practice to fell the tree, and cut rings through the bark a foot or eighteen inches apart; the milky juice was received in suitable vessels, and inspissated by boiling. Eventually the matter was taken up by an English Company, and the juice is now obtained in the same way as caoutchouc or india-rubber. It arrives in Europe in blocks several pounds in weight, and is generally found to be adulterated with sawdust, earth, and other impurities, introduced by the native producers to add to its weight. This adulteration offers one of the most serious difficulties encountered by the cable manufacturers. Elaborate and expensive machinery has to be employed, in order to reduce it to the absolute purity required to permit its use as an insulator.

Other objects of curiosity are the instruments employed at the sea-shore termini of submarine cables for transmitting signals under the ocean. Our readers are probably acquainted with the principle on which the signalling apparatus in use on land lines is constructed; it will be sufficient to remind them in general terms that most of these depend mainly on the discovery, by the German philosopher Oërsted, of Electro-magnetism.

About the year 1820, there occurred to Oërsted one of those brilliant accidents which, happening to a mind prepared to seize their significance, ripen into great discoveries. He was engaged in some electrical experiments with a voltaic battery, and held a small mariner's compass in his hand. He observed that the compass was deflected as the current passed. He repeated the experiment, and found that the effect of the current varied, according as the current passed above, below, or around, the magnetic needle. It was soon ascertained that the magnetic needle had a tendency to place itself at right angles to the direction of the current. By a brilliant effort of inductive reasoning, Oërsted sprang to the conclusion that the magnet obeys a constant directive action of the earth, caused by electric currents constantly passing the magnetic equator from east to west, and that the magnetic needle, subjected to the action of a current could, as his experiment showed to be the case, be moved at will; because the motive force, being nearer, and consequently more powerful than the ordinary terrestrial magnetism, overpowered the directive action of the earth. The identity of electricity with magnetism was thenceforth established.

Oërsted's experiment was soon followed to new and startling conclusions. The needle, it was observed, always placed itself in the same position relatively to the direction of the current. That direction may be best understood by an illustration.

If the wire were a canal, and the reader were swimming along it in the direction of the current, the north pole of a needle would always be deflected, to his left hand if placed before his breast, and to his right hand if placed behind his back.

It will be perceived from this, that if the wire is bent round the needle, its two halves act in the same direction, and the effect is doubled. If the wire be bent a second time round the needle, the effect will be again doubled, and a still further increase in the number of turns will produce a corresponding increase of force. If, then, a wire, covered with silk or gutta-percha, or other insulating material, is wound several times round a needle, and the current is thus compelled to pass along its whole course, at such a distance from the needle as to direct its action without touching it, the force of the current is multiplied in proportion to the number of turns.* A comparatively feeble current is thus able to effect great results. This, it will be seen, is, in fact, the modern telegraph. Currents of negative and positive electricity are sent along the line-wire, and passed at the receiving end round a magnetised needle. The result is the alternate right and left deflections with which every frequenter of railway stations is now so familiar.

On this principle, too, instruments for measuring currents are constructed. The simplest kind of galvanometer consists in a magnetised needle placed in the centre

* The action of the current cannot be multiplied indefinitely, because the intensity of the current diminishes as the length of the circuit increases. So if the wire is too long the current becomes very feeble, and at last there would be no current left to multiply.

of a hollow frame filled with covered wire; the degree to which the needle is deflected (as shown on a graduated scale which is centred on the needle pivot), indicating the quantity of electricity passing through the coils. The differential galvanometer differs from this instrument, in that it measures not the absolute strength of a current, but the difference of strength of two currents. Its wires are wound in two coils side by side; they are so arranged as to be exactly equal in their effects upon the needle. When two equal currents are made to pass in opposite directions through the coils, they will exactly balance one another, and the needle will not move; but if one current be stronger than the other, the balance will be destroyed, and the needle will obey the stronger, to an extent determined by the difference of strength of the two currents. The use of the differential principle will be very apparent when we come to the subject of duplex telegraphy. A wire through which a current is flowing, possesses for the time properties similar in many respects to those of a magnet. It attracts iron filings, attracts or repels the poles of a magnet, and acts upon other wires through which currents are moving. If, instead of passing round a magnetised needle, the wire is twisted round a bar of soft iron, the iron core becomes magnetic, and acquires for the time much greater power than it is possible to give to a permanent magnet. A current after traversing a line-wire can be made to electro-magnetise a bar at a receiving end, in such a manner that, in virtue of its temporary magnetism, it attracts a lever attached to its armature, and puts a fresh battery into circulation. By this means a current too feeble to record intelligible signals may be made to renew its strength over and over again, and transmit itself, strong and clear, through a circuit of length otherwise unmanageable.

Perhaps it would be as well to say here that a 'circuit,' telegraphically speaking, comprises first the earth, then batteries and other apparatus at the terminal station, then the line, and so through the other terminal apparatus and batteries to the earth again. Intermediate stations are introduced by cutting the wire, and placing the instruments between the divided ends. In the same manner a box of resistance-coils, shunts, or any kind of conductor may be interposed at any point of the circuit.

Steinheil was the first to employ the earth as a substitute in a telegraphic circuit for a return wire. He buried two copper plates, one at each station, and connecting the extremities of his telegraphic lines to these plates, he found that signals could be transmitted with as much facility as when a return wire was used. In fact, a circuit will work to a much greater distance when it is composed of half wire and half earth, than when it is composed only of wire.

It may readily be seen that as each mile of cable offers a certain resistance to the passage of the current, and each mile is subject to its own inductive retardation, the cumulative action of these causes through two or three thousand miles of cable so weakens the current that it retains but a small fraction of the strength with which it left the battery. So feeble is it, that it is unequal to the task of electro-magnetising an ordinary relay—an operation which, as performed on land lines, we have already described—nor is it strong enough to work even the lightest needle which could be suspended at the receiving end.

It is to the genius of Sir William Thomson that we owe the solution of this apparent impossibility. He attached a magnetised needle to a tiny mirror (mirror and needle together weighing scarcely more than a grain), and suspended it by a single fibre of unspun silk within the coils of a galvanometer. A cardboard screen was placed in front of the mirror, in which was perforated a narrow slit, and behind this he placed a lamp. The light from the lamp was reflected through the slit, on to the mirror, and thence back in the shape of a pencil of light to the screen. When the mirror galvanometer was connected with the line wire, and a current, however feeble, passed through its coils, the needle and mirror were deflected, and the reflected beam of light moved along the scale. By this arrangement, even though the movement of the needle should be so minute as to be quite imperceptible to the eye, the reflected beam moves through a very sensible arc on the screen, and the ordinary right and left signals of

telegraphy can thus be easily given and clearly read.

We have, of course, only given in mere outline the principle of this delicate instrument, which is adapted to practical work by many beautifully simple arrangements. But the main idea of making an imponderable beam of light do the duty of a heavy lever has alone made ocean telegraphy a possible feat. Another point of general interest is the manner in which electrical tests are performed. It does not at first appear easy to imagine how the position of a break or fault in a cable, hundreds of miles away under the sea, can be discovered with such precision that a repairing ship can be sent to the very spot. Here again we can only indicate a principle, the practical working is far too complicated to be understood without minute and careful examination, and the use of diagrams. But the principle may be made clear, and will give a good general idea of the *modus operandi*. It is all effected by a careful comparison of resistances. Those who have done us the favor to read the earlier part of this paper will understand what is meant by the resistance of a given circuit, and will also be acquainted with the construction and use of the instruments principally employed, namely, galvanometers, boxes of resistance coils, and condensers of known capacity.

If a needle be suspended between the coils of a differential galvanometer, and a current be sent through one of them, the needle will be deflected, say, to the left. A current of exactly the same strength as the first, sent simultaneously through the other coil, will cause the opposing currents to neutralise each other, and the needle will remain at rest; the box of resistance coils accords to the operator the power of placing in the path of the current any required resistance, from the tenth of an Ohm up to 40,000 Ohms, or more, by simply inserting or removing metal plugs in holes made for the purpose in the lid of the box. If, then, to the right-hand galvanometer coil be attached the box of resistances, and to the left-hand coil the line-wire requiring to be tested, all the operator has to do is to shift the resistance plugs till the line and the resistance box balance each other on the galvanometer. He then reads off the resistance which has brought the galvanometer to a standstill, and as he has made the two equal, it follows that he thus knows the resistance of the line-wire. Constant tests, made during manufacture and afterwards, have made him familiar with the exact resistance *per mile* offered by the line-wire; so that, dividing the total resistance by the resistance per mile, he obtains the length of wire under examination. Suppose the resistance per mile to be 4 Ohms, and the resistance which has produced a balance at the galvanometer is 40 Ohms, it follows the length of wire under examination is 10 miles. Now, assume that the matter to be ascertained in the above test was the unknown position of a 'fault,' you discover that the circuit was completed by the escape of the current to earth at a distance of 10 miles; you have thus determined that the naked end of the cable touches the earth at that distance, and that the fault is an absolute break in the cable 10 miles away.

It need not be said that this is testing in its simplest form; we have omitted all collateral circumstances which in practice would obscure the result, and make an apparently simple into a difficult operation. It is a very different matter when the fault is a mere flaw in an otherwise perfect cable, but this is the principle. Tests are taken hourly during the manufacture of a cable, to determine that it is electrically sound throughout, and that the insulation is complete. To ascertain the latter point, that is to say, that there is no leakage of electricity through the gutta-percha covering, the wire is first suddenly charged from a battery, and as suddenly discharged through a galvanometer. A certain deflection of the galvanometer needle is thereby produced, and noted as deflection No. 1. It is then charged a second time, and left for a few minutes, at the end of which it is again discharged through the galvanometer, and deflection No. 2 is noted; the difference between deflection No. 1 and deflection No. 2 corresponds to the amount lost by leakage during the time the wire remained charged.

It may easily be imagined that the tests are never more anxiously performed than when the cable, duly completed, and coiled in great tanks on board the

telegraph ship, is being slowly paid out into the deep. Every minute signals are passed from the shore to the ship, through the gradually increasing length of submerged line, through all the thousands of coils which lie piled, tier above tier, in the cable tanks, down to the testing cabin. There the electrician on duty sits with his mirror galvanometer, watching the reading-screen, where the movements of a small spot of light give him tidings of the shore he is leaving. The whole interest of a great and costly expedition is thus centred in the little quiet testing-room.

The operations, both of the ordinary working of submarine telegraphs and the testing operations, are much complicated by earth-currents. Very often, especially at the time when the phenomena of the Aurora Borealis are prevalent, strong currents pass over the lines, entering by one of the earth connections, and leaving it by the other. They are never constant for long together, and they change direction so rapidly as seriously to affect the delicate instruments in use on submarine lines. They are most violent during magnetic storms, which seem in some mysterious manner to be dependent upon the Aurora, which, in its turn, is a manifestation of some ultimate cause of which nothing positive is known. Observation shows that earth-currents are frequent at the time of earthquakes; the 'Journal of the Society of Telegraph Engineers' contains constant notes of these coincidences, observed by the ever-watchful members of the Society. Many of the most distinguished electricians think that the sun is the ultimate cause of this, as of all other forms of terrestrial magnetism, and it certainly seems probable that such is the case. It is well known that the period of maximum and minimum of spots on the sun extends over a cycle of eleven years, and during that time the Aurora becomes proportionately more or less intense. 'In 1850,' says Mr. Latimer Clarke, 'two simultaneous observations of the sun were made by observers many miles apart, when both saw a body flash into the sun and cause a disturbance of the sun's chromosphere; and it was subsequently found that at that moment almost all the magnets of the world were disturbed by this sudden movement.' The fact that the cause and effect were apparently simultaneous incidentally confirms the inference that the velocity of the transmission of magnetism is the same as the velocity of the transmission of light.

Sometimes the earth-currents are of enormous power. In 1871, a break having occurred in the Atlantic Cable, Mr. Graves was able to devote a great deal of time to the investigation and tabulation of the earth-currents which appeared on the broken line. At one time during a great magnetic storm, which was felt all over the world, Mr. Graves, who was observing at Valentia, saw currents of such strength, that 'a distinct arc of flame burned between the key and the earth connection.' The power necessary to produce this he estimated at not less than 2000 cells of Daniell's battery. The later Admiral FitzRoy found the indication of coming storms predicted with singular fidelity by magnetic disturbances of the earth. He could sometimes see the approach of a storm days before the barometer and thermometer indicated anything of the kind. The ordinary observations of the telegraph operators confirm this. They can actually feel a storm coming across the Atlantic for days beforehand, by the increasing vagaries of their troublesome visitor, the earth-currents. It is not improbable that observations may eventually be found susceptible of such generalisation as to afford really reliable weather forecasts.

One of the latest telegraphic marvels is the arrangement by which it is made possible to send two separate messages along the same wire in opposite directions at the same time. This is known as Duplex telegraphy; and perhaps nothing connected with the practical working of telegraphs has excited more wonder, and been found more difficult to understand. The first question which is naturally asked is, How can the currents pass one another in the line-wire? and, if they do pass, how is it that they do not interfere one with another? If, however, we have been fortunate enough to make clear the principle of the differential galvanometer, the difficulty will vanish. In sending an ordinary message, the current passes from the battery at the sending end through the instrument at that

end, along the line, through the instrument at the receiving end, and so through the earth back to the battery from which it started. In doing so it of course moves the instrument at the sending end, as well as the distant one; for it passes through them both. Now suppose that the operators at both ends were to dispute for the possession of the circuit, and send opposite currents simultaneously through the wire, the result would be hopelessly to confuse the signals, and make reading impossible; but if the operators were to set to work to unravel the apparent confusion, they would soon find that when station A and station B, in the course of their confused struggle for the possession of the line, happened to send a current in the same direction, the needle acted upon would strike the stops with double force, while, if they sent in opposite directions, the needle would hardly move at all. Thus each operator would be able to perceive that the signals of the other station were *visible* on his instrument, and were only prevented from being *legible* by the confusion introduced by the current he himself was sending along the wire. It would doubtless occur to them that if by any means each could so arrange that neither station's own or outgoing currents should affect his own needle, leaving the dial free to show only the effect produced by the incoming current, the difficulty of reading would vanish. The question then arises, How can each instrument be so connected that neither sender shall move his own needle, and yet so that the coils shall always remain in circuit?

Now, in a differential galvanometer, if two equal currents are simultaneously sent through the two coils in opposite directions, the result is that the needle stands still. Apply that principle to the line in such a way that the current, when either end makes a signal, shall at that end divide itself into two, and the two halves pass round the sending instrument in opposite directions. This will only happen when the two half-currents are exactly equal, which will only be the case if the two circuits they have to travel are equal. To effect this, one half-current must pass along the line-wire to earth, and the other half be sent to earth through a resistance exactly equal to the line-wire.

When the balance is established, neither sender, when he signals, will move his own instrument, which will be left free to record signals from the opposite side; but the operator at the other end will be able to read them, for each station will see the current sent by the other, though neither can see his own.

It will be seen that the two currents do not pass one another, as has been imagined, but that, when both stations signal at the same time, the current sent by either station acts upon the distant instrument, by determining whether the currents sent by that station shall pass through the line or the resistance-coils.

On land-lines suspended in the air the resistance of the signalling-wire to the current is easily ascertained, and is easily imitated on the second or artificial circuit; but in submarine lines there is not only the resistance to be taken into account, but the retarding capacity of the cable. In any given cable each mile presents a certain resistance, and also a certain retarding capacity. The second circuit on land-lines need only imitate the resistance, but in cables the retarding capacity must also be imitated. It is not enough that the whole of the second circuit should be equal to the whole of the cable, but that each separate part of it should be equal to each corresponding part of the cable. The latest plan, which seems at length to have made duplex working in submarine wires practically possible, is that adopted by Mr. Muirhead. He forms his second circuit by sheets of paper, prepared with paraffin, as an insulator, having on one side a strip of tinfoil wound to and fro, to represent the resistance, and on the other a sheet of tinfoil to represent its retarding capacity. Each strip of paper may thus be made to represent precisely a given length of cable; and a given number of such sheets would exactly imitate the cable in every part of its length; so that the non-signalling half of the current sent through the artificial resistance escapes to earth under precisely similar conditions to that which passes over the line.

The result of this is that a single wire will convey signals simultaneously in

two opposite directions, and that one wire will do the work of the two which have hitherto been required. On all marine lines this invention is of the greatest possible importance, because while theoretically it only doubles the carrying capacity of each cable, in practice it does a great deal more; as it does away with the loss of time consequent on arranging about the precedence of outward and homeward messages.

The method was first tried on the line between Marseilles and Bona, and it has since been brought into operation between Marseilles and Malta, between Suez and Aden, and, lastly, between Aden and Bombay. It is stated that on a recent occasion, when there was a breakdown of the Indo-European line, the duplex system became of the greatest possible use; and although there are still practical difficulties to be encountered before it can be adopted in lines where very long distances have to be accomplished without a break, there is no doubt that the theory is so well established that its universal adoption is only a question of time.

'The telegraph,' says Sir Linton Simmons, 'is an essential in war; war can scarcely be carried on without it.' Mr. George von Chauvin, who was secretary to the German Director-General of Telegraphs during the Franco-German war, appeared as a witness before a Committee of the House of Commons on Postal Telegraphs last year, and gave a very animated account of the way in which that service was performed by the German army during his period of service. He tells us that the telegraph was in constant use for the arrangement of the transport of ammunition; of the whole service of the commissariat; the transport of wounded soldiers and prisoners; for the regulation of traffic in the field railways, which was very heavy, and which frequently necessitated the shunting of ammunition trains to let a train of wounded soldiers go by, or stopping a train of soldiers to bring up ammunition. It was also used for the investiture of fortresses like Paris and Metz, where it would have been impossible to have an army large enough to girdle round the whole enceinte. The lines of attack round Paris extended some twenty German (above ninety English) miles; the field telegraph was used along this extended line to bring together troops whenever they were wanted, either to repel a sortie, or to make an attack. It was also used to keep the various corps of the army, operating in the centre, north, and south, in permanent connection with the head-quarters' staff at Versailles. Telegraphs also accompanied and kept up the communication of all detachments of independent corps, brigades or divisions, which operated independently against the smaller forces of the enemy. Thus immediate information was conveyed to head-quarters whenever an engagement took place within any of the ramifications of the gigantic spider's web, of the number of troops engaged, the result of the contest, and its probable effects; and new orders were given as to fresh steps to be taken. It may easily be believed that it was perfectly recognised by the German officers that the war could not have been conducted on this scale at all without the assistance of the telegraph.

The Germans had acquired telegraphic experience in two former wars. They consequently entered on the Franco-German campaign with a very complete organisation. They used three kinds of telegraph: the first, which was taken into the immediate proximity of the enemy; the second, the duty of which was to keep up communication between the advanced army corps and their basis of operation; and the third, the ordinary telegraph of the State. The whole system was under the command of a Colonel of the Royal Engineers, attached for service to the Telegraph Department of the State; the officers under him were officers of the Royal Engineers, the men mostly soldiers, but not necessarily engineers. They were taken from all arms, and a good many of them were employed as civilians in the ordinary time of peace. The duty of the advanced part of the field telegraph was to push on into the close proximity of the enemy. They did the service in the trenches before Paris, and carried on the work of communication whenever an action was going on. The telegraphists employed in the Prussian army during the war were trained in the State telegraphs: the soldiers taken from the ranks during the time of peace were

put for a certain time into the offices of the State Telegraph Department, and did the usual work of telegraph operators, linesmen, batterymen, and the other ordinary duties of telegraph departments. In peace-time they were placed under the command of Civil Service officers, and there was practically no distinction between them and the ordinary civilian who was employed by the Government. But this was the smallest class of trained military telegraphists employed by the Germans; a very large class were at once soldiers and telegraph men.

In Germany, as formerly in Prussia, a soldier who has served his time as non-commissioned officer and bears a good character, is entitled to employment in the Civil Service. By that means, not only does the army obtain a better supply of men for its non-commissioned officers, but it furnishes to the Telegraph Department a large class of men who, although not very smart operators, are yet very trustworthy, and, for the purposes of war, are perfectly indispensable.

'I do not know,' says Mr. Von Chauvin, 'what proportion of our ordinary telegraph operators in Germany have formerly served for a lengthened period in the army, but I should think it is a very large one, and the difficulty which we found whenever war broke out was not how to offer an inducement to our telegraph men to join the troops, but how to console those who were ordered to remain at home. They all wanted to go.'

The material used in the advanced telegraph services was exceedingly portable. Very light copper wire, light poles, which could be stuck into the ground by not too great an effort of a man ramming it down, and a large quantity of wire insulated with india-rubber, which was rolled out as necessity arose. The Department was furnished with wagons, such as are in use now in England, containing instruments, a small battery, a certain amount of wire, and accommodation for an operator to sit and to write in. The wagons could be taken about by a couple of strong horses at a pretty rapid pace; and the wire could be rolled out as it went along, and thus keep up communication with the troops behind. The second class of field telegraphs were what is called in Germany 'etappen' telegraphs; their duty was chiefly to maintain telegraphic communication between the advanced heads of the army corps and those places which, having been made depots for ammunition, or hospitals, formed the basis of operation for the more peaceful part of the warfare; there they linked on to the ordinary telegraphs of the State, which extended its ordinary strong and well-built lines over the frontier as the army advanced into France. As the Germans gradually introduced their postal system, sanitary arrangements, judges, and all the necessary machinery of civil Government, they also introduced the State telegraph system, which was thus kept in communication with the outposts. These three corps might be compared to light skirmishers, to a more solid advancing line, and then a solid mass of reserves. The materials which they used were very light in the first instance, were of intermediate size and quality for the second class, and were the ordinary heavy materials for the third class.

When Mr. Von Chauvin was asked whether in his opinion soldiers must be specially trained for telegraphic services in the field, and whether civilians could not supply their place, his answer was, that he believed a soldier would require a good training to be of any use as a telegraphist, and that a civilian would, as a rule, be of very little use. It would be very difficult and very irksome to place him under martial law, and operations cannot well be conducted in an enemy's country without having everybody under your command under martial law. It was also found by the Germans, as well as by ourselves, that, again, you cannot expect a civilian who has made up his mind to be a telegraph man for the rest of his life, and to work in a peaceful occupation, to sit in front of an enemy who is firing at him, and risk his life for the purpose of sending a message; whereas a soldier who makes up his mind when he joins the army to run the risk of being knocked on the head, will sit down to his work under fire without remonstrance, and in the ordinary course of duty.

The opinion expressed by Mr. Von Chauvin as to the competency of civilians to work the telegraph in the vicinity of a hostile force was strongly confirmed

by Sir Lintorn Simmons. He referred to the case of a civilian force in the Crimea, namely, the Army Works Corps, in which great difficulties occurred in carrying on the necessary works.

The organisation of the military telegraph department in this country does not differ very greatly from that adopted by the Germans. The nucleus of the force is a small body of Royal Engineers under their own officers, who in time of peace have charge of what is called 'the Eastern Engineering Division' of the postal telegraphs. They have under their charge nearly 10,000 miles of wire, and their *personnel* consists of four officers and forty-three non-commissioned officers and sappers, besides a few occasional additions to assist in the ordinary construction and maintenance work. These employés correspond to the ordinary division of the civil force. The senior officer takes the duty of divisional engineer; the next officers, captains and lieutenants, take the duty of superintendents; sergeants-major and sergeants take the duty of inspector and chief clerk; the corporals take the duty, as a rule, as clerks. The sappers become linesmen, storemen, and mechanics.

In the 'Journal' is found a very amusing account of the construction of the telegraph used during the Ashantee war, from the pen of its constructor, Lieut. Jekyll, of the Royal Engineers. At first, as will be remembered, it was intended to carry on the war by the aid of native levies alone, without the intervention of any Europeans. But a few days were sufficient to show that the idea of a railroad which was first contemplated was impracticable from the nature of the country, and that the idea of native levies was impracticable from the nature of the people. On landing at Cape Coast Castle, Sir Garnet Wolseley found it necessary to resolve on a total change of plan. He sent for English troops, countermanded the railroad material, and ordered a telegraph instead. So short was the notice, that the supply of stores could not be got ready in time to accompany the troops. The detachment, therefore, of twenty-five non-commissioned officers and sappers, started with such stores as they were able to collect on the instant, leaving the main bulk of their preparations to follow. Lieut. Jekyll, on his arrival at Cape Coast Castle, at once proceeded up country, and armed with a bag of silver coins, bought a supply of bamboos from the chiefs to form posts for his telegraph wires. Starting from a shackle on the roof of the Government House, the line proceeded in the direction of Coomassie at the rate of about two miles a day.

Lieut. Jekyll says of his native workmen, 'we were now furnished with a gang of fifty natives, whom we were to retain permanently, that is if we could. They were not promising in appearance, and I was compelled to dispense with the services of those who were less than 4 feet high. But they had with them an intelligent headman, and by dint of supervision, supplemented by a little flogging now and then, they soon turned out a tolerably useful body for light work, as niggers go.' The line ultimately extended to Accrofumu, about 100 miles from the coast.

The telegraph was regarded as the white man's fetish, and was looked upon as a most powerful charm. Shortly after crossing the Prah, the advanced parties discovered a white cotton-thread suspended from the trees, obviously in imitation of the line, for a distance of several miles. Part of this respect was, no doubt, owing to the fact that the workmen in making the line received several smart shocks of lightning while handling the wire. Lieut. Jekyll was at one time afraid that he would suffer serious inconvenience from that cause. One of the greatest difficulties to be encountered was naturally the climate. Many of the Europeans, including Lieut. Jekyll himself, were at one time down with fever. At one office the sapper operator was so ill with fever that he lap in bed in his office, with a black fellow to rouse him up whenever a message came which claimed his attention. Recording, that is, printing instruments, were principally used. But in the discussion which followed the reading of Lieut. Jekyll's paper, a great preference was expressed by the officers present for the sounder, which addresses itself to the ear. A quaint practical difficulty which was urged in favor of the recorder, was that in fever districts the operators got deaf from the effects of quinine, and were unable to hear the sounder. In reply to which, a

distinguished member of the Society triumphantly told a story, which, we are bound to admit, was received according to the Report with 'laughter,' of a blind girl who was able to read by smell:

'She placed her nose,' said the speaker, 'above the instrument, which was Bain's Chemical Recorder, and thus cyphered the despatch.'

We have left ourselves no space to make more than a passing allusion to the use of the torpedo in warfare. Indeed, the whole subject is still so much a matter of experiment, and is so far from having arrived at the point when it can be treated with any completeness, that it would not be easy to do more than detail experiments, even if we had space at our disposal. In the Report of the Secretary of the United States Navy, published as far back as December, 1865, when the torpedo system was only in its infancy, and manipulated by the Confederate engineers under every possible disadvantage, it is stated that when the United States fleet attacked Mobile and Wilmington, the sea defences of which mounted more than six hundred guns, although the shore batteries of the Confederates were splendidly served, the only vessels lost by the United States Government in both these attacks, were destroyed by electric torpedoes.

The important defence of the water approach to Richmond was entrusted to a single electric torpedo, sunk in the channel-way of the James River. The mine was under the control of an officer, who, stationed on one of the river banks, watched from the sand-pit where he lay concealed the approach of the enemy. A single stake planted on the opposite bank served to indicate the exact moment when an approaching vessel would be within the area of destruction. With the patience of a spider watching its victims, for thirteen months did this officer watch the opportunity to explode the mine with effect. At length the Federal fleet, under the command of Commodore Lee, entered the James River, the Commodore's vessel being third in the advancing rank.

The foremost vessel, carrying seven guns, and manned by a picked crew of one hundred and twenty-seven men, was allowed to pass over the mine in safety, it being by arrangement held in reserve for the Commodore's ship: but an order having been passed from the deck of the next ship, audible from the shore, to return and drag for torpedo-wires, the officer determined to explode his mine as she descended the stream. The explosion took place on a clear afternoon, and was witnessed by many persons. The hull of the vessel was visibly lifted out of the water, her boilers exploded, the smoke-stacks were carried away, and the crew projected into the air with extreme velocity. Out of the crew of one hundred and twenty-seven men, only three remained alive, the vessel itself being blown to atoms. The awfully sudden destruction of this ship saved Richmond for the time. Commodore Lee retired, sinking several of his ships to block up the channel.

Torpedoes are now so improved, that after they are submerged the operators on shore retain the power of the submarine and land circuits without fear of explosion, and are even able to speak and telegraph information through the charge without risk.

Every torpedo consists in its complete form of three parts; the ignitor, the charge, and the torpedo case or tank, together with the necessary arrangements for electric connections and conductors for giving the operator the entire control of the mine. The importance of accuracy and precision of ignition at sea will be easily understood, by calculating the length of time the enemy remains in the line of vision. A vessel steaming at the rate of nine miles an hour will move through the water at the rate of 18 feet per second; and supposing her to be 300 feet in length, she will remain in a position to receive the effects of a blow only sixteen seconds. One thing may be considered entirely proved, that for shore defences the old form of mechanical torpedo may be considered as quite superseded by the application of electricity to the purpose.

We had hoped to be able to give some account of the underground and overhead system of the postal telegraph in London and our great towns; but the subject would require a paper to itself, and our space is exhausted. We have not even room to discuss the system by which daily meteorological observations are transmitted from a hundred stations

to the Royal Observatory to be tabulated and arranged. For a similar reason we must leave unnoticed the application of the electric light to the light-houses on our shores, the use of electricity as applied to clocks, and the system of time-signals daily transmitted from the Royal Observatory to our naval arsenals and ports. We only enumerate them here to give point to the observation how completely this, the newest of the sciences, has entwined itself with the every-day business of life.—*Quarterly Review.*

THE RUSSIANS, THE TURKS, AND THE BULGARIANS.

At the Theatre of War.

BY ARCHIBALD FORBES.

I REGRET that for a few lines at the outset I must be egotistical, in order to explain what claims I have to speak on the subject of which this article treats. During the last five months I have been with Russian soldiers on the march or in the field; during the last three months I have been with them in Bulgaria north of the Balkans. I have been a close spectator of much hard fighting; I have been repeatedly with Cossacks or other cavalry acting as the extreme advance; I have traversed Bulgarian territory and entered Bulgarian villages in advance of any Russian troops. I have lived with, talked with, and dealt with the Bulgarian population, and taken great and persistent pains to ascertain their real condition and true character. I cannot profess to have had much close acquaintance with Turks, although I have taken every opportunity of talking (of course, through an interpreter) with prisoners, and with those who remained behind in the villages and towns, or who returned to their homes subsequently to the Russian occupation. But I have striven to note what they had done and what they had left undone. I have seen their conduct in battle, and their handiwork on the battlefield after the battle was over; I have striven from the aspect and surroundings of their deserted habitations to realise the habit of their lives in the times when as yet no enemy was within their gates. In fine, I may aver that my opportunities for observation have been exceptional, if not indeed unique, and I can further aver, in no spirit of boasting, that I have striven very hard to make the most of my opportunities.

Yet another short paragraph of egotism. I believe that I came to the work as completely a *tabula rasa* in the matter of prejudices, or indeed previous familiarity with the subject, as it is well possible to conceive. My work has always been the work of action; of politics either home or foreign I know shamefully little, and for them I ought to blush to own have cared yet less. Of the Eastern question I had not made even that extremely perfunctory study which the wide if thin field of leading articles affords. I had indeed repeatedly seen Turks as well as Russians fight in the Servian campaign of the previous year, but it was not difficult to discern that the fighting in Servia was not always 'on the square.' Having come thus blank to the observation of what has been passing in Bulgaria during the summer and autumn, I have no right to speak now as an argumentator, or commentator, or speculator; I can only venture to ask for some recognition simply as a witness, to which character in the following article I shall strive to confine myself. I ask to be regarded as an accurate witness, limiting myself to the sphere of my own personal observation: first, because I do in all humility think that I have some faculty of keen observation; secondly, because I am without any conscious prejudice except in favor of a good fighting man and against maudlin cant. And finally, I would ask to be regarded as an honest witness in virtue of the fact that what I am now doing must be greatly to my own detriment. In obeying the compulsion to fulfil a duty, I must offend many whose goodwill I would fain cherish, must let go many friendships which I value very dearly. In virtue of this paper I am resigning the promised honor of a decoration which

is given to foreigners with extreme rarity, and never given at all—wherein lies the pride of having it—but for some specific act of conduct on the battle-field.

I. The Russians.

The Russian has so many charming qualities, that there is a sense of ungraciousness in referring to his qualities of another character. He is a delightful comrade, his good-humor is inexhaustible, he puts up with hardships with a light heart, he is humane, has a certain genuine if unobtrusive magnanimity, and never decries an enemy. In the whole course of my experiences I encountered only two boorish and discourteous Russian officers. There can be no greater mistake than that the Russians are a suspicious race. The frank simplicity of the army amounted to a serious military error; spies might have swarmed unchallenged, and I have no doubt were in truth plentiful. Newspaper correspondents, once received, were accorded a freedom of movement, and were unchecked for a boldness of comment, wth a liberal toleration, and often indeed a frank encouragement, unprecedented in the annals of war. There was something magnificent, although it was not quite war, in the open candor of the advice given to correspondents, a week or so in advance, to betake themselves to specified points where interest was likely to develope itself. Generals or staff officers seldom hesitated to communicate to the inquiring correspondent the details of their dispositions, or to allow, indeed to encourage him to visit the forepost line. It is to the credit of correspondents with the Russians, many of whom were necessarily inexperienced in the discernment of what might probably be published as against what ought to be withheld, that the responsibility of self-restraint was so generally recognised. The Russian officer has the splendid valor of his nationality; he is no braggart, but does his fighting as a matter of course, and as part of the day's work, when he is bidden to do it. As for the Russian private, I regard him as the finest material for a soldier that the soldier-producing world, so far as I am acquainted with it, affords. He is an extraordinary weight-carrying marcher, tramping on mile after mile with a good heart, with singular freedom from reliance on sustenance, and with a good stomach for immediate fighting at the end of the longest foodless march. He never grumbles; matters must have come to a bad pass indeed, when he lets loose his tongue in adverse comment on his superiors. Inured to privation from his childhood, he is a hard man to starve, and will live on rations, or chance instalments of rations, at which the British barrack-room cur would turn up his nose. His sincere piety according to his narrow lights, his whole-hearted devotion to the Czar—which is ingrained into his mental system, not the result of a process of reasoning—and his constitutional courage, combine to bring it about that he faces the casualties of the battle-field with willing, prompt, and long-sustained bravery. He needs to be led, however; not so much because of the moral encouragement which a gallant leader imparts, but because, his reasoning faculties, for lack of education, being comparatively dormant, he does not know what to do when an unaccustomed or unlooked-for emergency occurs. He is destitute of perception when left to himself. Somebody must do the thinking for him, and impart to him the result of the process in the shape of an order; and then he can be trusted, while physical power lasts, to strive his pithiest to fulfil that order. But if there is nobody in front of him or within sight of him, to undertake the mental part of the work, the Russian soldier gets dazed. Even in his bewilderment, however, he is proof against panic, and we saw him with sore hearts at Plevna, on the 30th of July, standing up to be killed in piteously noble stubbornness of ignorance, rather than retreat without the orders which there were none to give. The Turkish soldier is his master in the intuitive perception of fighting necessities. The former is a born soldier, the latter a brave peasant drilled into a soldier. If the Turk advancing finds himself exposed to a flank attack, he needs no officer to order him to change his front: he grasps the situation for himself; and this is what the Russian soldier has neither intuitive soldierhood nor acquired intelligence to do.

Of the multitudinous 'atrocities' on

Turkish refugees charged against the Russian soldiery with so great persistent circumstantiality by Turkish authorities and their abettors, I have never found the smallest tittle of evidence, and on soul and conscience believe the allegations thereof to be utterly false. But as I must not speak of mere belief, it behoves me to say that of all events which occurred south of the Balkans I have merely hearsay knowledge. 'Atrocities' in plenty were, however, charged against the Russians north of the Balkans, and respecting these I can speak from a wide range of personal experience. The Turks resident in the towns and villages of Bulgaria were peremptorily enjoined by commands from Constantinople to quit their homes and retire before the advancing Russians. In the great majority of cases they did so, and their evacuation was accomplished before the first Russian reached the vicinage of their abodes. This was so at Sistova, at Batuk, and at many other places where murder and rapine were circumstantially and lyingly averred against the Russian soldiers. The Turks who anywhere chose to remain were unmolested without exception so far as I know. The orders that they should be so were strictly inculcated on the Russian *éclaireurs;* the Bulgarians were made acquainted with the injunctions of the Emperor by the Imperial proclamation widely although surreptitiously circulated in Bulgaria before the Danube was crossed. To this day you may see the cadi of Sistova walking about the town with an air as if he owned it. Gorni Lubnica is a large village not two hours' ride south of the Imperial and Grand Ducal headquarters in Gorni Studeni. Nearly half its population were Turks, more agricultural than most of their fellows, and of these a considerable number chose to remain in their dwellings and take their chance of the Russians. They were unmolested by the Bulgarian inhabitants and equally by the Russians. They dwell contentedly in their cottages, they have reaped their harvests and thrashed out their grain; you may see them fearlessly sauntering about their lanes, turban on head, none making them afraid. About Poradim, on the Plevna front of the Russians, many Turks remained in their dwellings; they met with no molestation, and are now earning a livelihood by carting to the front projectiles to be hurled against their brethren. It happened that by an accident I entered the town of Bjela in advance of the Russian cavalry, and while there still remained on its outskirts some Turkish irregulars. These went; nearly the whole of the civilian Turks had already departed, but there remained behind a few, some living openly, some seeking concealment. In the evening the Russian cavalry came in. The Turks who had chosen to stay openly at home were simply visited by an officer and bidden to stay where they were; those in concealment were searched for by the Russian soldiers aided in their investigation by the Bulgarians, when discovered kept under guard all night till the general had seen them, and then liberated, to return to their homes and avocations. The pillage of the subsequent night by Russian infantry stragglers was the only instance of serious indiscipline of which I am cognisant, and it was no pillage of Turks, but a rough miscellaneous sack of property, Bulgarian as well as Turkish, in which no personal injury was inflicted. A number of Bjela Turks who with their families had sought refuge in the woods around, and were suffering much from hardship and exposure, were visited and invited to return by order of the Emperor. They reoccupied their habitations, reaped their harvests, and I have seen them walking about the place among the Russians and Bulgarians with the utmost independence of bearing. When the Turkish soldiers in a panic evacuated Tirnova, there remained behind some sixty Turkish families. The Russian force was a flying detachment chiefly of Cossacks. Tirnova swarmed with Bulgarians professing bitter hostility to the Turks, fraternising warmly in copious raki with the Cossacks. Now, if ever, was the train kindled for insult and injury to the Turks at the hands of the Russians, under the temptations of instigation and drink. But by the Russians not a hair of their heads was injured, not a scrap of their property touched. As soon as might be, the officer in command detailed a guard to protect from marauding Bulgarians the section of the Turkish quarter where the population remained, and that guard

was maintained till the Russians instituted at Tirnova a civic government. Constantly accompanying Cossacks and other Russian cavalry in reconnaissances on the front of the Rustchuk army, I never noticed even any disposition to be cruel. Where Turks were found they were made prisoners, in virtue of the obvious necessities of warfare; when complained of, the accusations were judicially examined and justice done deliberately according to martial law. I do not aver, remember, that atrocities were not committed on fugitive Turks; but not by the Russians. While the Turks yet remained in their entirety in the mixed villages, the Bulgarians did not dare to meddle with them. Nor would they venture to interfere with remnants remaining behind from the general ex odus because they knew the terms of the Emperor's proclamation, and were afraid to be thus actively vindictive. But reprisals were not to be apprehended from Turks 'on the run,' encumbered with wives, children, and household substance; there was little danger that any brutality perpetrated on these forlorn fugitives should reach the ears of the Russians; and the Bulgarians in places questionless hardened their hearts, and fell on with bitter currish venom. But north of the Balkans, at least, Cossack lances and Russian sabres wrought no barbarity on defenceless men, women, and children. The Russian of my experience is instinctively a humane man, with a strong innate sense of the manliness of fair play. The Turkish prisoners I have ever seen well and even considerately treated.

The main causes of the inability of the Russian armies to achieve successes proportionate to the undoubted intrinsic quality of their fighting material are to my thinking three: corruption; favoritism (with its inevitable concomitant and result, intrigue); and general deficiency of a sense of responsibility among the officers all down the roll. Let me devote a separate paragraph to each of these blighting causes.

I tremble to think how high corruption reaches in the Russian army; I shudder to reflect how low it descends. It permeates and vitiates the whole military system. To be venal, so far from not being recognised as a crime, is not so much as regarded as a thing to be ashamed of. Peculation faces the inquirer at every turn; indeed it lies patently, glaringly on the surface. An illustrious personage, high in the army and near the throne, has mines which produce iorn. Desiring to sell this iron for military purposes, he, spite of his rank and position, had to accede to the universal usage, and bribe to gain his purpose—a perfectly honest and legitimate purpose. A Vienna contractor comes to intendance headquarters with intent to sell boots to the army. He learns that it is no use to forward his tender direct in a straightforward business way; he must be introduced. He finds the right person to introduce him, and duly arranges with him the terms under which the favor of introduction is to be accorded. The introduction is made, and the contractor displays his samples and states that he is prepared to supply boots of that quality at six roubles a pair. The answer given him is that his offer will be accepted, but that his invoice must be made out at the rate of seven roubles per pair, although the payment will be at the rate of the tender. The Russian Government had an account with the Roumanian railway, whereon the statement of the latter showed the former to be a debtor to the amount of ten million roubles. The Roumanian people pressed for payment, but obviously a preliminary duty was a searching audit. The Russian functionary concerned comes to the director of the railway with a proposition. This proposition is that the audit shall be a merely formal operation, on condition that he, the Russian functionary, shall receive a douceur or commission of half a rouble on every thousand roubles, for smoothing the track of an operation which if rigidly, far more if hostilely, carried out, must be arduous and vexatious. Fifty copecks on each thousand roubles seems a bagatelle, but where ten millions of roubles are concerned, the *dustouri* reaches the pretty penny of nearly a hundred pounds. Scarcely anywhere are the accumulated Russian stores—at Bucharest, at Fatesti, at Simnitza, at Sistova, at Braila—protected by shedding from the destructive influences of weather. Why should they be, when it is in the interest of all concerned except the

state and the army, that the inevitable result should ensue—the rotting and condemnation of a huge proportion of the accumulated stores? The contractors are paid by a commission on the quantity of material laid down by them in certain specified places; their commission is earned when that work has been accomplished; their commission swells in proportion to the quantities of fresh supplies rendered necessary by the unserviceability of what has already been laid down. Every intendant concerned has a pinch, greater or smaller according to his position, of this commission; it is to the direct general and several interest of the gang that as much weather damage as may be shall occur among the supplies when once laid down. If any man wants proof of the universal system of plunder, he has only to visit Roumania and use his eyes. He will find the restaurants thronged with gentlemen of the twisted shoulder-knots. Their pay is a pittance, and it is in arrears: Jews, Greeks, and Bulgarians, the debris of the mercantile class, they have no private fortunes. But each gallant besworded non-combatant eats of the costliest dishes, and orders sweet champagne in grating French; the *tout ensemble* of him would not be complete unless his companion were some French or Roumanian beauty, as venal as himself, who is serving him as he is serving Holy Russia. A French correspondent, with a disinclination for going to the front, and a desire to employ his spare time, has been employing himself in collecting and authenticating cases of peculation throughout the Russian army, the record to be published at a safe season when the war is over. The exposure will astonish the world—at least that portion of the world which does not know Russia. In the meantime I venture to assert that every article of consumption or wear supplied to the Russian army costs, by the time it comes into use, more than double what it ought to do under a well-managed and decently honest system. Of other and yet baser corruption—of the little difficulty with which men of whom other things might be expected are to be found willing to be virtual traitors for a consideration, by offering to sell secrets and secret documents—I dare not trust myself to speak. The subject is too grievously melancholy.

Favoritism brings it about that commands are bestowed on men within its ring-fence, with little or no reference to qualifications. The Russian officer does not need merit if he can only attain to 'protection.' With 'protection,' a youngster may be a colonel in command of the grizzled veteran of hard campaigns and many decorations, who, destitute of 'protection,' is still but a first lieutenant. The aim in making appointments at the beginning of this war seems to have been to exclude from active service every man who has ever distinguished himself in a previous command. Todleben has been only sent for now as a last resource. Kauffmann, the conqueror of Khiva, was left behind to chew the cud of his experience. Bariatinsky was not withdrawn from the neglected retirement into which he had been suffered to lapse. Kotzebue's experience of command in active service remained unutilised. Tchernaieff, who with a mass of untrained militia kept the Turks four months at bay, was left for months to cool his heels in Russia, was at length insulted with the offer of the command of a brigade in Asia, and has now finally been ordered back into retirement at the instance of the Archduke Michael—jealous of the ovations with which a fine soldier and really capable chief was received on arriving at the former's headquarters. Nepokoitchitzky's claim to be chief of the staff lies simply, so far as I can gather, in his knowledge of the Danubian valley on the Roumanian side of the river, derived by having served in the force which in 1853–4 scarcely covered itself with glory in fighting against the Turks. At Ploesti he seemed to me to fulfil the *rôle* of a superior sort of staff sergeant, always walking about with a handful of returns and states. He is a dumb man—and dumb seemingly from not having anything to say. Levitsky, his *sous-chef*, is a young professor, utterly devoid of experience except in the handling in manœuvres of comparatively small bodies of men; pragmatic and arrogant, but with a strong will, which, in conjunction with his incapacity, has been one of the chief factors in the failure hitherto of the Russian army. But he

is within the ring-fence of 'protection,' and holds his ground against the clamors and murmurs of the army. To be within that pale is to be safe, if not from contumely, at least from open disgrace. If there be one thing more certain than another in connection with this war, it is that Prince Schakoffskoy ought to have been tried and broke for insubordination and disobedience of orders at the battle of Plevna of the 30th of July. But he still commands his army corps, and, so far as I know, did not even receive a direct reprimand. In the old days Krüdner would have been sent to Siberia for the unmilitary and insubordinate act of assembling a batch of correspondents and essaying to vindicate his conduct through them to the world by the publication of the essentially private orders under which he was forced peremptorily to act. But he holds his position in command of a corps, although his immunity may indeed be owing to the fact of his grimly and threateningly holding the telegrams which exonerate him at the expense of others. Schilder-Schuldner, the hero of the utterly 'unspeakable' first fiasco at Plevna, still retains the command of the fragment of that brigade which his crass blundering shattered there. General Kriloff, who the other day, entrusted with a mass of Russian cavalry, and charged with the task of blocking the Sofia road, supinely failed to intercept reinforcements and supplies marching on Plevna, enjoys the equivocal credit of an exploit which the English military reader may be excused for regarding as well nigh impossible. He commanded for a year a cavalry division at Warsaw, during the whole of which time he possessed no charger, although he drew rations, or rather their money, equivalent for six.

Favoritism as inevitably begets intrigue as rottenness engenders maggots. Under an irresponsible absolutism the Absolute must have an almost impossible thoroughness and strength of purpose if favors do not frequently go through caprice and from other motives than the sheer claims of honest desert. So far as I can see, even the recognition of merit in the Russian Court and military circle is too often capricious. Young Skobeloff had fought as splendidly on the grey morning when we crossed the Danube and plashed through the mud on its further bank to come to close quarters with the enemy, as on the day when he gained the name of the 'hero of Lovca,' or on that other later day when he stood master of the three Turkish redoubts on the south-west of Plevna. But whereas on the news of Lovca he was toasted at the Imperial board, and whereas the Plevna fighting worthily earned him his Lieutenant-Generalcy, after the first exploit, when the Emperor embraced Dragimiroff and shook hands with Volchine, he turned his back ostentatiously on Skobeloff, simply because he was out of favor, and had not yet got back into favor by dint of hard fighting. Every Russian circle I have had experience of—the camp—court, the headquarter staff, the subsidiary staffs, the regiment, the battalion—each is a focus of unworthy intrigue. Men live in superficial amity one with another, while, to use an Americanism, they are 'going behind' each other by every underhand means in their power. Young Skobeloff was under a cloud, and Prince—— was his enemy. Skobeloff, who is not a courtier, cleft the cloud with the edge of his good sword, and the cloud drifts on to settle above Prince——. General Ignatieff is in high favor seemingly fixed firmly in his place close to the Emperor's right hand, a man of power, influence, and position. The bad fortune of the war goads certain people on whom the odium lies of that bad fortune, to wrath against the man who had done so much to bring the war about. There is a period of swaying to and fro of the forces of intrigue, and then Ignatieff goes back to Russia to assist his wife in the nursing of her sick sister. The wheel will come full circle again, no doubt, and then that presently afflicted lady will recover. The mischief of this all-pervading intrigue is that it is a distraction of the forces that ought to be concentrated on real and earnest duty. A man cannot concentrate all his energies on aiding in coping with the king's enemies without, when he has to spend—or waste—a share of them in plotting to get the better of the man in the next tent, or to foil the devices of that man to get the better of him. And, unfortunately, the man who is the greatest adept in intrigue, and benefits by it in the attainment of a high

place, has not always—indeed, as intrigue is demoralising, it may be said seldom—the qualifications which the high place into which he may have intrigued himself demands.

The deficiency in an adequate sense of responsibility is greatly caused by the evil treated of in the last paragraph. But, indeed, it seems to me that the lack of that thoroughness which a sense of responsibility inspires, is innate in the Russian military character, so far as preparation, organisation, and system, distinguished from mere fighting, are concerned. The Orientalism of the Russian extraction tends to *laissez-faire*—hinders from the patient, plodding, steady industry of the North German soldiering man. Nobody holds himself directly charged with the responsibility of the urgent mending of a bridge, and the bridge is not mended. Nobody has it borne in upon him that it is a bounden duty he owes to himself, to his comrades, and to the State, to see that reserves are ready at hand to be used in the nick of time, and an enterprise collapses for want of reserves. A general of division gets an order to send forward into the fight two of his regiments. His luncheon is spread under yonder tree. A German or an English general would disregard his food, and concentrate himself on the proper execution of the work; his staff officers would compete with each other in orderly zeal for the successful fulfilment of the order, and crave furthermore for the good luck of being permitted to take a share in the 'fun.' It is as likely as not—I have witnessed the scene—that the Russian general endorses the order, and passes it on to the brigadier by the messenger who has brought it, while he and his *fainéant* staff officers, who have been sitting supinely about when they ought to have been in the saddle, seek the grateful shade of the tree and the contented enjoyment of the refection. Coming down from the Shipka Pass while the fate of the fighting there hung in the scales, I was sent for by the commander-in-chief to give a narrative of what I had seen. The circumstance vividly impressed me, that with the exception of Monseigneur himself, nobody appeared to feel that the general staff, and he himself as a member of it, had intense, engrossing, overwhelming concern with the issue of that terrible combat. The subject was discussed with vivacious interest—indeed, with curiosity, with more or less of intelligence; but very much in the tone in which it might have been discussed by a coterie in the Army and Navy Club. With the exception indicated, there was no recognition or apparent realisation of responsibility. I left the kibitka with the curious sense that I, the stranger and the foreigner, was, save one, the man who felt the most concern in the episode and the result. Except as regards the actual fighting, there is a strange, inappropriate dilettantism about the soldiering of the officerhood of the Russian army. There is a disregard of the grand military fact that if success is to be achieved, every man, each in his place, must put his hand to the work as if he were working for his own hand—ay, for his own honor and his own life.

One word as to the Emperor. I would have it to be understood that no word I have written can apply to him. His position, in proportion to the fulness with which his character is recognised, must move to the sincerest respect and the deepest sympathy. He is a true patriot, earnestly striving for the welfare of his country. But he toils amid obstacles, he struggles in the heart of gathered and incrusted impediments, the perception of which on his part must, it seems to me, kindle wrath which is unavailable, bring about misgivings which must awfully perturb, induce a despair which must strike to the very heart. He is not answerable for the growing up of the false system which strikes at the vitals of the Russian army, but he cannot but recognise the blighting curse of it. He is not the Hercules to cleanse the huge Augean stable; but he knows, and in this hour of terrible trial must revolt from the foulness of it with a disgust that is all the more loathing because it is impotent. I sincerely believe that the Emperor is the Russian who in all unselfishness suffers the direst pangs of anguish under a Russian disaster.

II. The Turks.

The Turks have blundered greatly in the management of their military affairs, but two mistakes of theirs were of such

exceptional magnitude, that they loom high above minor errors. The Turks are barbarians, pure and simple. They have neither part nor lot in civilisation: their religion and its injunctions, their origin, the area of their empire, their conservatism, bar them out from membership in the European family circle. It may be and has been contended that this being so, Europe is no place for them; but with this phase of the subject, involving as it does argument, I have no concern. I would merely remark that when it shall have been conclusively proved that they are out of place in Europe, there remains the physical task of acting on the conclusion; and that task, to the lot of whomsoever it may fall, does not quite bear the aspect of a holiday undertaking. Meanwhile they are barbarians, and they are in Europe. As barbarians and as non-aggressives, it would have been quite consistent for them this spring to hold some such language as the following to all whom it might concern: 'We do not want to go to war, but if any power thinks proper to assail us, we give due forewarning that we are barbarians, and will defend ourselves by barbarian tactics. Our religion enjoins on us the ruthless slaughter of the infidel. If we are assailed we give fair warning that we will neither ask nor give quarter; that we will, *more nostro*, torture, chop, hack, and mutilate our wounded enemies, encumber ourselves with no prisoners, despise such finicalities as flags of truce; our battle-cry will be *deen* to the Giaour. You are entitled to know this, because the knowledge may be a factor among the considerations which affect your final resolution. If after this intimation you are still bent on assailing us, why, then come on and see how you like it.' This intimation the Turks did not make, but they have consistently acted according to its literal terms. I have myself seen great clumps of mutilated Russian dead on battle-fields. I have watched, without the need of a glass, the Bashi-Bazouks swarming out after an unsuccessful attack on the part of the Russians, and administering the *coup de grâce* with fell alacrity, under the eyes of the regulars in the sheltered trenches. This style of fighting is working its inevitable result on the Russian soldier, who hesitates to face this grim additional casualty of the battle-field, and it is no improbable supposition that the candid premonition of it would have weighed with the Russian authorities on whom would have rested the responsibility of making war in the face of it. But the Turks have tried to blow hot and cold—to profit by their barbarism, and plough with the heifer of civilisation. While slaying and sparing not, they have addressed whining, and it may be added lying, appeals to Europe, invoking the enactments of the Geneva Convention, which they themselves set at naught. Wielding the axe and chopper of ruthless savages, they have acted like a pack of querulous and mendacious old women, in cackling to Europe their trumped-up allegations of violations of civilised warfare on the part of their enemies. They have thus sacrificed the sternly intelligible consistency of an attitude of persistent indomitable barbarism, and have admitted the jurisdiction of a court from whose bar it should have been their policy to stand aloof. This has been one capital error on their part: an error which may cost them infinitely dearer than defiant contumacy would have done.

Their second cardinal error comes within the pale of civilised warfare. Not having chosen to resist in force the Russian crossing of the Danube, and having elected to fall back before the invaders of Bulgaria, it was on the part of the Turks a grave military omission that they did not lay waste the territory which they left open to that invader's occupation. Had the territory been exclusively inhabited by their own people, it would have been none the less a military duty to have destroyed the crops, burnt the villages to the last cottage, and left only desolation behind them. It might have been that some fanatic philanthropists might have clamored of the inhumanity of this line of action; but sensible people would have sorrowfully recognised it as one of the stern necessities of ever-cruel war. The Russians could have uttered no reproach, with the precedent in their own history wrought by Kutusoff, Barclay de Tolly, and Rastapchin. If precedents are wanted of a later date, the American civil war—a war between brethren—swarms with them. If the Turks should

have obeyed the demands of a military necessity, had the civilian population been mainly their own people, how much less incumbent on them was it to admit deterrent humanitarian considerations as the case stood! The whole Turkish population was ordered back by a command from Constantinople: there remained only Bulgarians, co-religionists of the invader, notoriously sympathisers with his aims, notoriously disaffected to Turkish rule, sure to become guides, spies, hewers of wood and drawers of water to their 'deliverers,' willing vendors to these of their substance. To leave behind, instead of reeking desolation, a land flowing with milk and honey, a land swarming with unmolested friends to the invader, was a piece of military lunacy almost unparalleled. The Turks should have driven the Bulgarian population inland before them to the last man, and left extant not a sheaf of barley that could have been destroyed. That they did not do so was the second of the two glaring mistakes I have indicated. When the defects of the Russian supply system are taken into consideration, there is no need to waste space in detailing the certainty, or in speculating on the probabilities, with which desolating tactics were pregnant.

It is no task of mine to inquire why the Turks did not pursue these tactics. It may be said that they did not because of their crassness, their hurry, their carelessness, their lack of military foresight; why suggest further reasons? But the outcome, as a hard fact, stands that the Bulgarian population, left behind unmolested when the Turks fell back, were spared unheard-of suffering. They were in fact left in full enjoyment of their prosperity, it might be for ever, certainly for an indefinite period. I want to know, if the Turks choose to assert that they thus sacrificed themselves and spared the Bulgarians from motives exclusively of pure humanity, on what valid grounds is any one to contradict them? If I find my way into a cellar full of untold gold, and am found coming out with empty pockets, am I not, even were I by habit and repute a thief, entitled to claim that my honesty deterred me from plunder? I have said that the Turks are barbarians, and that they are ruthless savages when their fighting blood is up; but there is no inconsistency between this attribute and the attribute of contemptuous good-natured humanity, or rather perhaps tolerant unaggressiveness, when nothing has occurred to stir the pulse of the savage spirit. And I sincerely believe, on the evidence of my own eyes and ears, that the Turks—the dominant race in virtue of those characteristics which, until the millennium, will ever continue to insure the dominance of a race—allowed the Bulgarians—the subject race in virtue of those characteristics which, while they exist, will always make a race subject to some one or other—to have by no means a bad time of it. Proof of this belief I will adduce in detail when I come to deal with the Bulgarians. But just cast a hasty glance at the conduct of the barbarian Turks during the past two years. The period opens with the Bulgarians, subject indeed to the Turks, taxed, no doubt, heavily and arbitrarily, annoyed occasionally by a zaptieh who must have been nearly as bad as the omnipotent 'agent' on the estate of an Irish absentee landlord, bound to dismount when encountering a Turk on the road, just as a rural inferior at home is virtually bound to touch his hat to his local superior; but withal prospering mightily. The recently imported Circassians are a thorn in their flesh, against whom they have to put up iron bars and keep numerous fierce dogs, precautions which do not always avail; but the Circassian nuisance may be 'squared' by judicious occasional presents of poultry and farm produce to the moullah of the district. The Bulgarian population, it is true, are debarred from aspiring to any, even the meanest public function, not even having the distinguished privilege, so much prized by the business Englishman of being summoned on a jury when private avocations are exceptionally engrossing. To judge by the manner in which the Bulgarian civic functionaries appointed by Prince Tcherkasky are presently fulfilling their duties, from the municipal councillor who is making haste to be rich by pillaging alike casual Russian and resident countryman, to the street policeman of Tirnova or Gabrova, who, clothed in a little brief authority, whacks about him indiscriminately with his ratan, it may be questioned whether the general progress

of the world was seriously retarded by the enforced abstention of the Bulgarians from a share in the management of public affairs.

It was no doubt a sad thing that the stalwart manhood of the Bulgarians was debarred from proving in the defence of the country that it had a heart in keeping with its thews and sinews, although circumstances may inspire a doubt whether the iron of this prohibition ate deeply into the Bulgarian heart. The country was badly governed, or rather in effect it was hardly governed at all, and this is exactly the state of things in which the astute man who knows the trick of buying protection is sure to get on by no means badly. I do not mean to say that it was all smooth and pleasant for the Bulgarians, or indeed for any of the races of which the population of Turkey in Europe is made up; but their lot, from all I have been able to learn, was tolerable enough. It seems to have been a lot for which the practical British philanthropist would gladly see a considerable section of his fellow country people exchange their own wretched, sodden, hopeless plight. The life of the Bulgarian was eminently preferable to that of the miserable victims of the 'sweater' who exist rather than live in Whitechapel garrets. I think Devonshire Giles, with his nine shillings a week and a few mugs of cider, would cheerfully have put up with the zaptieh, exclusion from a share in the management of public affairs—although his home share of that privilege is so large and so highly prized—and would have ever been resigned under the dispensation of debarment from military service, for the sake of the rich acres of pasture and barley land, the cattle and brood mares of the rural Bulgarian. I know that the Russian peasant soldier who has crossed the Danube as the 'deliverer' of the Bulgarian from 'oppression,' feels with a stolid bewildered envy that, to use a slang phrase, he would be glad indeed 'to have half his complaint.'

The times, no doubt, had a certain roughness, and occasionally there were Bulgarians who could not accept the roughs with the smooths, and who kicked against the pricks. There have been Irishmen who have manifested active discontent with the rule of the 'hated Saxon,' and who have been made to suffer for their peculiar way of looking at things. The discontented Bulgarians sometimes were sent to prison, but mostly escaped into neutral territory without undergoing this infliction; and wherever they found themselves—in Bucharest, in Galatz, up among the hills at Cronstadt, or down in the flat at Crajovo or Turn Severin—there they sedulously plotted against the Turkish dominance over the Bulgaria from which they were exiles. I suppose they had a perfect right to do this, and to strive to implicate in their plots their brethren who still remained 'oppressed,' if prosperous: only the man who plots and the man who joins a plot must, like the man who speculates, be prepared to take the consequences of failure.

As for the argument that the Turks were new-comers and have no abiding places in European Turkey, but that their tenure there is but the empire of superior power—if that is to be admitted and acted on, there logically follows a revolution in the face of the world, and all but universal chaos. We must quit India, and bid an apologetic adieu to the Maori, the Kaffir, and the Hottentot, the Spaniard from whom we wrested Gibraltar, the Dutchman from whom we masterfully took the Cape. We are to take ship from the jetties over which frown the Heights of Abraham, and leave the French *habitants* and the remnant of red men left at Cachnawaga to settle between them the ownership of Canada East. Poland must revolt against Austria, Prussia, Russia; the Tartars of the Crimea are to make a struggle for independence; the Irish are to drive forth the Saxon viceroy and his myrmidons at the point of the shillelagh; the Austro-Hungarian Empire shall blaze into a chaotic conflagration, in which 'furious Frank and fiery Hun,' Serb, Magyar, Croat, and Teuton shall seethe confusedly.

The Bulgarians who abode at home, ignoring their substantial prosperity, and stimulated by their grudge against the Turk by reason of his masterfulness and his religion, tempted further by encouragement that came to them from Russian sources in Constantinople, listened to the voice of their exiled countrymen persuading them to insurrection. Persistent efforts have been made to minim-

ise the radius and importance of the organisation of that uprising which collapsed so futilely and for which the penalty was so tragic. But these efforts can avail nothing before hard facts. When Tchernaieff was in England last winter, he detailed to me the widespread ramifications of the organisation for revolt all over Bulgaria, north as well as south of the Balkans, of which documentary evidence and fullest verbal assurances were furnished to him by the various Committees outside Bulgaria, as he passed through the south of Russia and Roumania on his way to Servia. I could name several gentlemen with whom Tchernaieff, during the same visit, entered into the fullest particularity of details on this subject. It was by reason of the assurances of support and cooperation on which his knowledge of this organisation entitled him to rely, that he dared to violate strict military considerations, and struck across the frontier into Bulgaria as soon as Servia had declared war. We know how feeble and patchy was the rising of the Bulgarians in reality, but that was owing not to the scanty area of the organisation, but to the unpracticality of the conspirators and the faint-heartedness of the instruments. There was no outbreak at all north of the Balkans, but do not let it be supposed therefore that there was no organisation for revolt. At Poradim, just before the July battle of Plevna, I, in company with a Russian staff-officer of high position, fell in with a Bulgarian who, now a thriving villager there, had during the previous year been the agent in Plevna of the American Book Society. Six years previously he had been imprisoned for active disaffection, but had regained his liberty by bribery. He had been the head centre of the insurrectionary organisation in and around Plevna in 1875–6. He showed us the lists of membership and of subscriptions —the latter not particularly reckless in their liberality. Everything had been pre-arranged, but when the time came there was not even a 'cabbage garden' rising. The conspirators realised that the theory and practice of insurrection were two very different things, and remained content with the former luxury. The 'head centre' had thought it prudent to relegate himself to village life and to make a friend of the local moullah through the medium of presents of poultry.

The Bulgarian risings, then, such as they were, occurred. The Turks probably were unacquainted with the extent of the organisation, but we must assume that they at least knew something. For the rest, *omne ignotum pro magnifico*. They had their hands full already. Montenegro and the Herzegovine were harassing them sorely: Servia was getting ready for war with all the energy of which she was capable. Other insurrections threatened in other regions of the great incongruous empire. This one at least was in the hollow of their hand; it must be crushed, stamped out, annihilated. The barbarian had got his provocation, and the savage strain in his blood went aboil. We all know what happened in the hapless regions where afterwards Mr. MacGahan wrote and Lady Strangford worked. It can be the task surely of no decent man to be the apologist of tne Turkish wild beasts who ravaged and ravished in those fell days. But, on the other hand, indignation is misplaced against wild beasts, who simply do what 'tis their nature to' when provocation kindles the savage 'streak' in their nature. What is the use? It is folly to feel wroth with the elephant who goes 'must' and pulverises his mahout. He is 'must,' and there is an end of it.*

* Nor can the barbarians, on whom rests the responsibility of the horrors of Batak and Prestovica, urge in extenuation that the history of races claiming the graces of civilization can afford them some instances which, in some sense, they can cite as precedents. It is a calumny that a modern Galgacus might have said of the men restoring quietude to the north of Scotland under the personal superintendence of Duke William of Cumberland, malignantly styled the Butcher—'*solitudinem faciunt, pacem appellant.*' It is the most baseless chimera that a British general still alive, commanded with his suave 'Ah, exactly, a thousand thanks!' that a batch of 'niggers' should be blown from the mouths of British cannon, whom two words of inquiry would have proved to be performing menial service to his own column, or that British lancers in the same campaign could boast of having three women spitted on their lances at the same time. Pelissier, 'alias Le Roy,' was one of the mildest of men, and the insurgent Arabs, who died in the caverns of Dahra, perished from accidental asphyxiation. It is a ridiculous untruth that the military policy of the United States of America, as regards the

But the Turkish barbarities, like the Bulgarian actual risings, were localised. Perhaps the Turks were ignorant of the North Balkan complicity; perhaps they ignored it; perhaps, seeing it had come to nothing, they gave no heed to it at all. Be that as it may, in all my wayfarings, from the Lom near to the Vid, from the Danube to the Balkans, I could neither hear of nor find human being who had suffered because of the business of last year; and I am sure I inquired sedulously enough. I found no man scored with yataghan slashes, no woman with a story of outrage, which from my later experiences I believe she would have been frank enough with if she had cause to speak. Last year's straw stack stands in the farmyard of every Bulgarian cottager; the color of its thatch proves that his habitation is not an erection of yesterday. The two-year colt trots on the lea along with the dam and the foal. His buffaloes are mature in their ugliness; his wife's white-metal water pails are pitted with the dints of years. And if the belongings of the rural Bulgarian furnish testimony to the hitherto stable security of his way of life, not less do the surroundings of the townspeople prove their abiding conviction of non-molestation. Of the vines whose leaves and tendrils spread with verdant green shade over the garden arbors of Sistova, and whose fruit clusters dangle on the brown fronts of Drenova's old oaken houses, the gnarled stems are as thick as my wrist. Pretty Maritza of Tirnova shows you proudly her blooming balsams, and tells you how she took the trouble to bespeak the seed a year in advance from a famous balsam cultivator across the Balkans in Kesanlik. It is to be doubted now whether he will ever grow balsams more. Her mother displays the yet remaining large stock of her last autumn's preservings. And, by the way, it was of this same mother that the tale was written to England how the Pasha had informed her he would hang her, and indeed had even fixed the day for the operation, on the charge of concealing some obnoxious personage. I was given to understand, indeed, that some unpleasant communications had passed between the Pasha and the good lady, but how much, or little, she was perturbed thereby, may be gathered from the fact that she did not desist from her placid preparation of paprika paste —no, not on the very day named or reported to have been named for disqualifying her from the further enjoyment of that dainty.

The Turkish soldiers, when the Russians made good their footing on the southern bank of the Danube, evacuated Sistova without so much as breaking a twig on the front of a Bulgarian house. Their civilian brethren had already departed with like unanimity of harmlessness. The disorganised bands of soldiers fell back through the rural villages without so much as filching a Bulgarian goose or requisitioning a Bulgarian egg. A Turkish army abode for days around Bjela, and finally departed, its rearguard consisting of irregulars, without a jot of injury wrought on the townfolk or their property. All along the Turkish retreat from the Jantra to the Lom, the Bulgarian experienced the same immunity. The Turkish inhabitants quitted, and the Turkish troops ran away from Tirnova without a blow or a robbery. It may, in fine, be said that the Turks departed absolutely harmlessly out of the territory from the Danube to the Balkans, of which the Russians stood possessed when their area of occupation was largest. How the Bulgarians requited this forbearance—or immunity, if the other word seems to ask too much—will have to be told later.

As the Russians have drawn in from the outskirts of that area, and the Turks have occupied the vacated territory, the immunity has ceased. It is not given to barbarians to accept with Christian resignation, or civilised phlegm, the spectacle of their dwellings wantonly razed, their crops stolen and sold, their little garden patches obliterated. They know that the miserables they find unaccountably remaining in the villages, deprived of Russian protection, were the culprits. They know that these welcomed the enemy of the Turk, acted as his guides, served him as spies, and found in him a customer for the Turkish crops. They know that these hung on the rear of the hapless retreating Turkish villagers in

Red Indian, is that of deliberate extermination. In the annals of Poland, 1831 is a halcyon year, and as for Mouravieff, he was soft-hearted to a fault.

July, and slew them ruthlessly—men, women, and children—when the safe chance offered. So the 'unspeakable' Turk lets the rough edge of his barbarism come uppermost again, and perpetrates atrocities—inflicts reprisals? Bah! what matters it about a form of words?

III. The Bulgarians.

I have found it impossible to avoid saying a good deal of the Bulgarians when writing under the preceding heading, and so much are the two subjects intermingled that in writing under the present heading I cannot hope wholly to exclude reference to the Turks. It must be understood that as I have never been across the Balkans, my observations in the character of a witness must be held as applying exclusively to the Bulgarians between that range and the Danube within the region of the Russian occupation. Nor must it be forgotten that this country is Bulgaria proper, where the Bulgarian race is purest: the Roumelian Bulgarians are affected, whether for good or evil, by a considerable miscellaneous intermixture of other races.

An outspoken Russian of my acquaintance, after a large campaigning experience of them, gave it as his belief regarding the North-Balkan Bulgarians that they must either be the result of a temporary lapse in the creative vigilance, or that they must be accepted as a refutation of the Darwinian theory of the survival of the fittest. My Russian friend had doubtless good cause of disgust for the Bulgarians, but I venture to regard his expressions as rather too strong. My experience of the Bulgarians, indeed, is that they have fewer of the attributes calculated to kindle sympathetic regard and beget genial interest than any other race of whose character I have had opportunities of judging. But they have some good points, more especially the rural Bulgarians. They have prospered by reason of sedulous industry practised to some extent at least under arduous conditions, and this is an unquestionable merit. Their prosperity has indeed been used as an argument why the Turks, whose bent is far from being so keenly towards industry, and who accordingly do not display evidences of so great material prosperity, should therefore cease to be the master people. It is not for me to combat this or any other argument, but I may venture to suggest that if a maximum of prosperity is to be regarded as the criterion, we Britons must retire *en masse* into private life in favor of the Jewish element in our midst. It tells doubtless in favor of the Bulgarian that he is in name a Christian; although his 'evidences of Christianity,' so far as I have cognisance of them, consist chiefly in his piously crossing himself in starting to drive a vehicle for the hire of which he has charged double a liberally reasonable sum, after having profusely invoked the name of the Saviour to corroborate his asservations that the price he asks is ruinously low. He cannot be denied a certain candor, which sometimes has a cynical flavor in it, as when he coolly tells a Russian, who in the character of his 'deliverer' is remonstrating against his withholding of supplies or his extortionate charges for them, that 'the Turk was good enough for him, and that he didn't want deliverance.' The Bulgarian is singularly adaptive. He realised his 'deliverance' with extreme promptitude of perception, resulting in bumptious arrogance. He drove his ox-cart with nonchalant obstinacy in the only practicable rut, and grinned affably when your carriage springs were broken in scrambling out of it to pass him. In the towns he held the crown of the causeway; in the country regions near the forepost lines he sees it to be expedient to pursue the career of a double spy and a double traitor.

In the preceding section I have spoken at length of his material prosperity prior to the arrival of the 'deliverers.' The two races—Turk and Bulgarian—dwelt apart; and the Bulgarian, as he drove his wainload of bearded wheat, or his herd of plump cattle and fertile brood mares down the slope to his white cottage among its corn-stacks bowered among the trees by the fountain, must often have smiled grimly as his eye caught the barer farm-yards and the scantier comfort of the Turkish quarter, and the ramshackle hovels among the scrappy tobacco-plots of the Circassian squatters on or beyond the outskirts of the village. The Bulgarian kept the village shop, and the Turk, when he came

for his necessaries, had to sniff the hated odor of pork sausages. The village swarmed with Christian pigs free to roam into the Turkish quarter till chevied by Moslem dogs. If in the towns and large villages the Bulgarian ear had to put up with the call of the Muezzin from the minaret of a mosque, the Osmanli were fain to tolerate the clangor of the bells from the glittering towers of floridly ornate Christian churches. For every mosque in Bulgaria there are at least three churches. Draw near to Sistova from what direction you will, the sparkle of the metallic covering of the towers of churches, imposing in all the showy garishness of Byzantine architecture, first meets the eye. From the Russian batteries on the blood-stained height of Radisovo you discern where lies Plevna nestling among the foliage, not by the slender white minarets, but by the glittering domes and stately spires of her Christian churches.

If ever one race owed a deep obligation to another, the Bulgarians did to the Turks, for the forbearance of the latter in leaving them and theirs unmolested in the evacuation before the advancing Russians in the last days of June and July. The non-molestation on the part of those 'unspeakable' barbarians was as thorough as that on the part of the last remnant of the German army of occupation, which Manteuffel marched from out the gates of Verdun through fertile Lorraine and over the new frontier line bisecting the battle-field of Gravelotte. And how was this forbearance requited—a forbearance that might have gone far to dim the memory of the conventional 'four centuries of oppression'? The moment the last Turk was gone from Sistova—not before, for your Bulgarian is not fond of chancing contingencies—the Bulgarians of that town betook themselves to the sack, plunder, and destruction of the dwellings vacated by the Turks. They might have served an apprenticeship with the Circassians, so dexterous and efficient was their handiwork. I have seen few dismaler spectacles than that presented by the Turkish quarter of Sistova when I visited it two days after the crossing. To me, as representing a journal whose goodwill the Bulgarians cherished, the Bulgarian *patres conscripti* of Sistova strove to mitigate the disgrace of this wanton outrage. It had been wrought by the scum of the place while as yet order had not succeeded to anarchy—the Cossacks had had a hand in it, which was a lie—the town was ashamed of the outburst of spite, for which nevertheless it was hinted there was some palliation in the 'four hundred years of oppression.' But stern measures had been taken to arrest any further devastation (there was little left to wreck), a committee had been formed to collect into the care of the authorities all the plunder, penalties had been enacted for its retention, and the effects were to be stored to await the return of the owners, to whom in the meantime—some of them being understood not to have gone far—overtures were to be sent begging their return and assuring them of safety. I went out from among the *patres conscripti*, and, ascending the staircase in the minaret of a mosque which had been wrecked and defiled, saw from the summit Bulgarian youths pursuing unchecked the work of wanton destruction on outlying Turkish houses. If the committee was ever formed at all, no results followed. The plunder remained with the plunderers; nobody was punished.

The conscript fathers of Sistova told me also that, to save Bulgaria's discredit in the eyes of Europe, emissaries would be sent out into the villages and towns, praying their inhabitants to behavior more worthy of civilisation than Sistova had been able to compass. If they were sent with such a message, it must have been read backwards by the recipients. In every town and village of Bulgaria whence the Turkish inhabitants have fled, their houses were at once wrecked, the huts of the Circassian burnt to the ground. Colonel Lennox and Lord Melgund must be able to testify with how great order the Turks evacuated Bjela. I can speak to the unharmed state of the place when I entered it while as yet the Turkish irregulars were not out of sight. I can speak also to the zest with which its Bulgarian inhabitants began to wreak their spite on the houses of the Turks as soon as they believed that the presence of Arnoldi's dragoons on the heights above the place deprived the work of any risk. Before the Emperor came to Bjela, it took some days to repair or

clear away the dilapidations wrought in the Turkish bey's house which he was to inhabit, and after all His Majesty could not but have noticed evidences of the ravage which had been wrought on it. Now this bey was a special favorite of the Bjela Bulgarians. He had effectually kept Bashi-Bazouks and Circassians from molesting them, and they had begged the good man not to go, assuring him that they would tell the Russians how much they owed him. He had to reply that his orders from Constantinople were imperative, and farewells passed with protestations of mutual goodwill. If the bey had thought better of it, and had come back next day, he would have returned to a house wrecked by his well-wishers of the day before. For aught I know, the fittings and timbers of the abandoned Turkish houses of Tirnova still furnish its Bulgarian inhabitants with their supplies of firewood. This was so the last time I was in Tirnova, in the end of August.

It would be interesting to hear Prince Tcherkasky's candid opinion as to the fitness of the Bulgarians for civic self-government. I never had but one occasion to appeal to an official Bulgarian, and the result was not encouraging. I had bought a pony from a Bulgarian citizen of Sistova. As I was not prepared for the moment to take the animal away, I handed to the vendor, in the presence of witnesses, half the purchase money, and a trifle to keep the pony well till I should send for it in a couple of days. The transaction occurred in the man's own house; he was no horsecoper, but everything around him indicated that he was a respectable citizen. Two days later I sent my servant for the pony. On his way he met the citizen riding the beast. My servant hailed him, whereupon he immediately wheeled about and galloped off to parts unknown. My servant, and subsequently myself, visited his residence, where his sister, who was his housekeeper, smiled blandly upon us, and declared herself ignorant whither he had gone or when he would return. I made a formal complaint in writing to a Bulgarian official in the police-office indicated as the right man to whom to complain, but never again saw either citizen, pony, or money. The complaint died a natural death.

Let me say a few words of what was virtually the civil war between the Turks and Bulgarians, which fringed the edges of General Gourko's operations across the Balkans. I speak, it is true, from hearsay evidence, but there could be no better nor more direct hearsay evidence. The Bulgarians begged arms of the Russians, and received them; then, hot with the fell memories of last year, and conscious that Russians were with and for them, they fell on the Turks with the most ruthless reprisals. I anticipate with interest the publication of his experiences by Mr. Rose, the correspondent of the *Scotsman*, who accompanied General Gourko's advance, and in whose way fell frequent opportunities of witnessing the conduct of armed Bulgarians. Be it understood I am not blaming them for what they did. I neither praise any one nor blame any one. But this I say, that all the Turks are reported as having done on their reoccupation of the districts, the Turkish grip on which was temporarily let go by reason of Gourko's raid, is on credible evidence not one whit more barbarous than was the conduct of the Bulgarians towards the Turks when Gourko's star was in the ascendant. The barbarian has acted like a savage in his reprisals; the Christian acted equally like a savage in what were virtually his reprisals for what happened a year previously. The one 'terror' has but followed on the other. Apologists for the proven barbarity of the Bulgarians—men who acknowledge that they saw them driven away with horror by Russian officers from their work of slaughtering Turkish wounded, over whom an advancing Russian column had passed—advance the plea, *ad culpam minuendam*, that the Bulgarians have at least not ravished. There is told a different tale in the sad spectacle of the four Jewish ladies, sisters, now forlornly resident in the house of a merchant banker in Bucharest of their own faith—outraged by God knows what ruffiandom of uncounted Bulgarians in sight of their own father as he lay dying murdered in his own house in Carlovo.

I ought to say that what I have incorporated in the foregoing article has been gathered by me piecemeal with constant assiduity, by dint of personal investigation and questioning. I have tried never

to let an opportunity slip of getting even a scrap or a sidelight of information. My medium of questioning was my servant, a Servian of whose truthfulness I have had long experience, and who spoke Bulgarian with the fluency of a native, and Turkish and Russian very fairly. I may add that, as a Serb, he was a bitter Turko-phobe, and that all his sympathies were with the Bulgarians. —*The Nineteenth Century.*

THE MURDER OF THOMAS BECKET.

BY JAMES ANTHONY FROUDE.

By the terms of the peace of Frêteval, the archbishop was to be restored to his estates and dignity. He on his part had given assurances of his intentions with which Henry had professed himself satisfied. Private communications had passed between him and the king, the nature of which is known only to us through the archbishop's representations to his friends. That the reconciliation, however, was left incomplete, is evident both from Becket's conduct and from Henry's. The king had made the return of his favor conditional on Becket's conduct. Either he did not trust Becket's promises, or the promises were less ample than he desired.

Immediately after the interview the king became dangerously ill, and for a month he believed that he was dying. Becket returned to Sens, and sent messengers to England to young Henry announcing his approaching return, and requesting that his estates should be made over at once to his own people. The messengers were instructed privately to communicate with his English friends, and ascertain the state of public feeling. The young king named a day on which the trust should be made over to the archbishop's officials, and advised that the archbishop should remain for a while on the continent, and endeavor to recover his father's confidence. The messengers reported that he had many staunch supporters, the Earl of Cornwall among them; but they were unanimously of opinion that it would be unwise for the archbishop to reappear at Canterbury so long as the old king's distrust continued. The peace of Frêteval, therefore, was obviously understood to have been inconclusive by all parties. The inconclusiveness was made still more apparent immediately after.

At the beginning of September, Henry had partially recovered. The archbishop sent John of Salisbury and Herbert of Bosham to him to complain of the delay with the estates. He had been watched, perhaps, more closely than he was aware. The king knew nothing as yet of the intended excommunication of the bishops. But he knew Becket's character. He felt it more than probable that mischief was meditated. He said that he must wait to see how the archbishop conducted himself.

Passionate as usual, the archbishop complained to the pope; he intimated that only his holiness's orders prevented him from revenging his ill-treatment. Prudence, however, told him that if he was to make an effective use of the excommunications which the pope had trusted to him, he must for the present restrain himself. Twice again he saw the king at Tours, and afterwards at Amboise. Henry was reserved, but not unkind. The archbishop had professed a wish for peace. If his behavior after his return to England proved that he was in earnest in these professions—if he remained quietly in his province, and made no further disturbances—the king said that he was prepared to show him every possible kindness.

The king needed no more complete justification of his suspicions than an expression which Becket used in relating this conversation to his friend Herbert. 'As the king was speaking,' he said, 'I thought of the words: "All these things will I give thee if thou wilt fall down and worship me."' It is evident on the face of the narrative that the king never gave the conscious sanction to violent measures against the bishops, which Becket pretended afterwards that he had received. In answer to his complaints at Amboise, Henry may have told him that the rights of the see of Canterbury

should be assured, and that, if those rights had been impaired, satisfaction should be made to him. To this last conference, and to some such words as these, the Count of Blois may have referred in his letter to the pope. But Becket and his friends put a construction upon the promises which none knew better than they that Henry did not intend. It is as certain that Becket's own professions were no less equivocal—that when he spoke of peace he was thinking only of a peace of which he was to dictate the terms, and that he had already determined to reopen the war on a new stage on the instant of his return to his cathedral.

But the return was now determined on, be the consequences what they might. The English bishops had their friends among the cardinals. In the course of the autumn it became known in England that the archbishop had applied for censures against the bishops, and that the pope had granted them. They advised the king to insist that Becket should bind himself by some more explicit engagements before he should be allowed to land, that he should be examined especially as to whether he had received any letters of excommunication from Rome, and that if he were in possession of such letters he should surrender them. Henry preferred to trust to the archbishop's honor, or to the watchfulness of the wardens of the ports. He was weary of the struggle. Doubtless he had his misgivings, as the bishops had; but he had made up his mind that the experiment should be tried, with, on his part at least, a faithful discharge of his own engagements.

The archbishop had gone to Rouen in November to settle accounts with creditors who had advanced him money. He had meant to see Henry once more, but Henry wrote to say that the delay of his return had led to disquieting rumors which ought not to continue. He desired the archbishop to go back to Canterbury at once; and, that he might be subjected to no inconvenience on landing, he sent John of Oxford, whose person was well known, to accompany and protect him. John of Oxford's instructions were, after seeing Becket safe at Canterbury, to go on to the young king and give orders for the immediate restoration of the property of the see.

The die was cast. The archbishop resolved to go. There was abundant disaffection in England. In the spring of this very year, the king had been obliged to suspend the sheriffs in every county, and ultimately to remove many of them, for extortion and oppression.* The clergy were lukewarm in his interests; but there were better reasons for relying upon the nobles. The king had thrust a bridle in their mouths, restraining what they called their liberties, and many of them, as was afterwards proved, were ready to make common cause with the Church against the Crown. The archbishop was perfectly right in expecting to find among the laity a party who would stand by him. He went once more to Sens to take leave of his entertainers. After an affectionate parting with Lewis and the Queen of France, retaining still his old taste for magnificence, he rode down to the coast with an escort of a hundred cavaliers, and there once more, separated from him but by a few hours' sail, lay the white cliffs of England.

It was thought likely, if it was not known for certain, that Becket would bring with him letters from the pope, and the introduction of such letters, if to the hurt of any English subject, was against the law, without a written license from the king. The duty of the wardens of the ports was to search the persons and the baggage of any one whom there was ground for suspecting, and on reaching the coast Becket learned that the three prelates who were to be excommunicated, the Sheriff of Kent, Sir Ranulf de Broc, and Sir Reginald de Warenne, one of the council of the young king, were waiting for him at Dover to ascertain whether he was the bearer of any such explosive missile. The future martyr was not select in his language, 'Archdevils,' 'priests of Baal,' 'standard-bearers of the Balaamites,' 'children of perdition,' were the common phrases with which he described the unfortunate bishops who were thus trying to escape their sentences. To outwit their vigilance, a day or two before he meant to

* Benedict.

sail, he sent over a boy in a small vessel whose insignificant appearance would attract no attention. The boy or nun (for there is reason to suppose that the bearer was a woman disguised) presented himself suddenly before the Archbishop of York in St. Peter's Oratory at Dover, placed the letter of suspension in his hands, and disappeared before he had time to learn its contents. In the same hour, and by the same instrument, the still more terrible letters of excommunication were served on the Bishops of London and Salisbury. Their precautions had been baffled. The shots had been fired which opened the new campaign, and the mark had been successfully hit. Sir Ranulf de Broc searched the town with a drawn sword for the audacious messenger, but the messenger had vanished.

It would have gone ill with Becket had he landed in the midst of the storm which the delivery of the letters instantly kindled. The ground of the censures was the coronation of the young king. To excommunicate the bishops who had officiated was to deny the young king's title to the crown. The archbishop had come back then, it seemed, to defy the government and light a civil war. The next morning, when he and his friends were examining the vessel in which they were about to embark, an English boat ran into the harbor. Some one leaped on shore, and, coming straight to Herbert, told him that if the archbishop went to Dover he was a dead man; the excommunications had set the country on fire. A rapid council was held. Several of the priests were frightened. The certain displeasure of the king was admitted with a frankness which showed how little Becket really supposed that Henry would approve what he had done. Becket asked Herbert for advice. Herbert, always the worst adviser that he could have consulted, said that they must advance or fall into disgrace. Let the archbishop go boldly forward, and he would tread the dragon under his feet. The worst that could befall him was a glorious martyrdom.

Much of this fine language may have been an afterthought. The archbishop, when a choice of conduct lay before him, was certain to choose the most rash. He decided, however, to avoid Dover, and on the morning of the 1st of December he sailed up the river to Sandwich, with his cross raised conspicuously above the figure-head of his ship. Sandwich was his own town. The inhabitants were lieges of the see, and a vast and delighted crowd was gathered on the quay to receive him. The change of destination was known at Dover Castle. Sir Reginald de Warenne, the Sheriff of Kent, and Ranulf de Broc, had ridden across, and had arrived at Sandwich before the archbishop landed. John of Oxford hurried to them with the king's orders that the archbishop was to be received in peace. They advanced in consequence without their arms, and inquired the meaning of the excommunication of the bishops. To their extreme surprise, they were told that the letters had been issued with the king's knowledge and permission. To so bold an assertion no immediate answer was possible. They pointed to his train, among whom were some French clergy. Strangers coming into England without a passport were required to swear allegiance for the time of their stay. The sheriff said that the priests must take the usual oaths. Becket scornfully answered that no clerk in his company should take any oath at all. He declined further conversation, and bade them come to him after two days to the palace of Canterbury if they had more to say.

Becket passed the remainder of the day at Sandwich. The next morning he set out for his cathedral. Seven years he had been absent, and for all those years his name had been a household word in castle and parsonage, grange and cabin. In England people sympathise instinctively with every one who opposes the Crown, and between Sandwich and Canterbury Becket was among his own tenants, to whom he had been a gentler master than Ranulf de Broc. The short winter day's ride was one long triumphal procession. Old men, women, and children lined the roads on their knees to beg his blessing. Clergy came at the head of their parishioners with garlands and banners. Boys chanted hymns. Slowly at a foot's pace the archbishop made his way among the delighted multitudes. It was evening before he reached Canterbury. He went direct to the cathedral. His face shone as he en-

tered, 'like the face of Moses when he descended from the mount.' He seated himself on his throne, and the monks came one by one and kissed him. Tears were in all eyes. 'My lord,' Herbert whispered to him, 'it matters not now when you depart hence. Christ has conquered. Christ is now king.' 'He looked at me,' says Herbert, 'but he did not speak.'

Strangely in that distant century, where the general history is but outline, and the colors are dim, and the lights and shadows fall where modern imagination chooses to throw them, and the great men and women who figured on the world's stage are, for the most part, only names, the story of Becket, in these last days of it especially, stands out as in some indelible photograph, every minutest feature of it as distinct as if it were present to our eyes. We have the terrible drama before us in all its details. We see the actors, we hear their very words, we catch the tones of their voices, we perceive their motives; we observe them from day to day, and hour to hour; we comprehend and sympathise with the passions through the fierce collision of which the action was worked out to its catastrophe. The importance of the questions which were at issue, the characters of the chief performers, and the intense interest with which they were watched by the spectators, raise the biographies and letters in which the story is preserved to a level of literary excellence far beyond what is to be found in all contemporary writings.

The archbishop slept in his desolate palace. No preparations had been made for him. The stores had not been laid in. The barns and byres were empty. Ranulf de Broc had swept up the last harvest, and had left the lands bare. In the morning (December 3) de Warenne and the sheriff reappeared with the chaplains of the three bishops. They had been led to hope, they said, that the archbishop would come home in peace. Instead of peace he had brought a sword. By scattering excommunications without notice, he was introducing confusion into every department of the realm. The very crown was made dependent on the archbishop's will. The law of England was reduced to the archbishop's edicts. Such an assumption could not and would not be allowed. The excommunication of the bishops was a direct blow at the authority of the young king. For the archbishop's own sake they advised him, and in the king's name they commanded him, to take the censures off, or a time might come when he would regret his violence too late to repair it.

Until the issue of the sentences against the three bishops, Alexander had not committed himself to any positive act in Becket's favor, and it had been to compromise the papacy distinctly in the quarrel that the pope's letters had been thus immediately discharged. Becket answered that the excommunications had been issued by the supreme pontiff, and that he could not undo the work of his superior. He admitted, with exasperating satire, that he was not displeased to see his holiness defend the Church with his own hands. To punish men who had broken the law was not to show contempt of the king. He had himself complained to the king of the bishops' conduct, and the king had promised that he should have satisfaction. For the rest he acknowledged no right in the king or any man to challenge his conduct. He bore the spiritual sword, and did not mean to shrink from drawing it against sinners, whatever might be the inconvenience. If the bishops would take an oath to submit to any sentence which the pope might pass upon them, he would strain a point and absolve them; without such an oath, never.

The answer was carried to Dover. Foliot and the Bishop of Salisbury were willing, it was said, to have sworn as Becket prescribed. The archbishop declared that he would spend the last farthing that he possessed rather than yield to such insolence. The young king was at Winchester.* De Warenne hastened to him to report Becket's behavior, and probably to ask instructions as to what the bishops should do. They crossed eventually to the old king's court in Normandy, but not till after a delay of more than a fortnight at Dover. Obviously the conduct which they were to pursue was carefully canvassed and deliberately resolved upon. Becket himself, too, found it prudent to offer expla-

* Not Woodstock, as is generally said. William of Canterbury, with special reference to localities, says Wintonia.

nations, and sent the Prior of Dover after de Warenne to Winchester to report the archbishop's arrival, and to ask permission for him to present himself. From the rapidity with which events now passed, the prior must have ridden night and day. Young Henry being still under age, the archbishop's messenger was received by his guardians, whom he found in towering indignation. The excommunication was regarded as an invitation to rebellion, and had Henry died in August there undoubtedly would have been rebellion. 'Does the archbishop mean to make pagans of us, with his suspensions and curses?' they said; 'does he intend to upset the throne?' The prior asked to be allowed to see the young king himself. He assured them that the archbishop had meant no injury to him. No one in the realm besides his father loved the prince more dearly. The displeasure was only that other hands than those of the primate had placed the crown upon his head. He repeated the story that the old king knew what was to be done to the bishops. He trusted that the young king would not refuse to receive a person who only desired to do him loyal service.

The court was evidently perplexed by the confident assertions with respect to Henry. The Earl of Cornwall advised that Becket should be allowed to come; they could hear from himself an explanation of the mystery. Geoffrey Ridel, the Archdeacon of Salisbury, happened, however, to be present. Ridel was one of Henry the Second's most confidential advisers, whom Becket had cursed at Vezelay and habitually spoke of as an archdevil. He had been intimately acquainted with the whole details of the quarrel from its commencement, and was able to affirm positively that the things were not as Becket represented. He recommended the guardians to consult the king before the archbishop was admitted; and the Prior of Dover was, in consequence, dismissed without an answer.

The archbishop had committed himself so deeply that he could not afford to wait. His hope was to carry the country with him before the king could interfere, or at least to have formed a party too strong to be roughly dealt with. The Prior of Dover not having brought back a positive prohibition, he left Canterbury professedly to go himself to Winchester: but he chose to take London in his way; it was easy to say that he had been long absent; that his flock required his presence; that there were children to be confirmed, candidates for the priesthood to be ordained—holy rites of all kinds, too long neglected, to be attended to. There was no difficulty in finding an excuse for a circuit through the province; and the archi-episcopal visitation assumed the form of a military parade. Few as the days had been since he had set his foot on the English shore, he had contrived to gather about him a knot of laymen of high birth and station. *Quidam illustres*, certain persons of distinction, attended him with their armed retainers, and, surrounded by a steel-clad retinue with glancing morions and bristling lances, the archbishop set out for London a week after his return from the Continent. Rochester lay in his way. Rochester Castle was one of the strongholds which he had challenged for his own. The gates of the castle remained closed against him, but the townsmen received him as their liege lord. As he approached Southwark the citizens poured out to greet the illustrious Churchman who had dared to defy his sovereign. A vast procession of three thousand clergy and scholars formed on the road, and went before him chanting a Te Deum; and this passionate display had a deliberate and dangerous meaning which every one who took part in it understood. To the anxious eyes of the court it was a first step in treason, and in the midst of the shouts of the crowd a voice was distinguished, saying, 'Archbishop, 'ware the knife!'

It was on December 13 that Becket reached London Bridge. He slept that night close by, at the palace of the old Bishop of Winchester. His movements had been watched. The next morning Sir Jocelyn of Arundel and another knight waited on him with an order from the court at Winchester to return instantly to Canterbury, and to move no more about the realm with armed men. The archbishop had not ventured so far to be frightened at the first hard word. He received Sir Jocelyn as a king might receive a rebel feudatory. With lofty fierceness he said he would go back at

no man's bidding if Christmas had not been so near when he desired to be in his cathedral. 'May I not visit my diocese?' he demanded. 'Will the king drive off the shepherd that the wolf may tear the flock? Let God see to it!' Arundel said that he had come to deliver the king's commands, not to dispute about them. 'Carry back, then, my commands to your king,' said the archbishop. 'Your commands!' Arundel retorted; 'address your commands to those of your own order.' Turning sternly to the young lords in the archbishop's suite, he bade them remember their duties, and rode off with his companion.

To obey was to lose the game. Instead of obeying, the archbishop went on to Harrow, a benefice of his own into which an incumbent had been intruded by the Crown. From Harrow he sent for the old Abbot of St. Albans, and despatched him to Winchester with a list of complaints. At the same time, and to learn the strength of the party at court which he supposed to be ready to stand by him, he sent a monk—apparently William of Canterbury, who tells the story—on a secret and dangerous mission to the Earl of Cornwall. The monk went disguised as a physician, Becket bidding him write word how things were going. The words in which he gave the order show his intention beyond possibility of question. The pretended physician was to go *velut alter Cushy*, and Cushy was the messenger who brought word to David that the Lord had avenged him of his enemies, and that the young king Absalom was dead.

The Earl of Cornwall was well-disposed to Becket, but was true to his king and his country. When the rebellion actually broke out three years after, the Earl of Cornwall's loyalty saved Henry's crown. He was willing to befriend the archbishop within the limits of law, but not to the extent upon which Becket counted. He received the disguised monk into his household; he examined him closely as to the archbishop's intentions. He would perhaps have allowed him to remain, but a servant of the young king recognised the man through his assumed character as one of Becket's immediate followers two days after his arrival. The earl bade him begone on the instant, and tell his master to look to himself; his life was in peril.

The Abbot of St. Albans had travelled more slowly. The discovery was a bad preparation for his reception. Sir Jocelyn of Arundel had brought back Becket's insolent answer, and the open disobedience of the order to return to Canterbury could be construed only as defiance. To the alarmed guardians it seemed as if an insurrection might break out at any moment. The abbot found the court at Breamore, near Fordingbridge, in Hampshire. He was admitted, and he presented his schedule of wrongs, which, after all, was trifling. The archbishop's clergy were forbidden to leave the realm. He had been promised restitution of his property, but it had been given back to him in ruins. His game had been destroyed; his woods had been cut down; his benefices were detained from him. As a last outrage, since his return Sir Ranulf de Broc had seized a cargo of wine which he had brought over with the old king's permission. The vessel in which it had arrived had been scuttled, and the crew had been incarcerated. God was injured when his clergy were injured, the abbot said, and in Becket's name he demanded redress.

The abbot had spoken firmly, but in language and manner he had at least recognised that he was a subject addressing his sovereign. A priest in his train, with Becket's own temper in him, thundered out as the abbot had ended: 'Thus saith the Lord Primate, "Let man so think of us as ministers of Christ and stewards of the mysteries of God. If justice be not done as right demands, ye need not doubt that we will do our part and use the powers which God has committed to us."' The fierce message was delivered amidst scowling groups of knights and nobles. Hot youths clenched their fists and clutched their dagger-hilts. A courtier told the bold priest that, but for the honor of the king's presence, he should suffer for his insolence. Sir Reginald de Warenne, who was present, said, 'The bows are bent on both sides.' The Earl of Cornwall, fresh from his conference with Becket's secret messenger, muttered, 'Ere Lent there will be wild work in England.'

The archbishop was still at Harrow

when the abbot came back with an account of his reception. Many things the abbot must have been able to tell him which have been left unrecorded. Thus much, at any rate, must have been made plain — that the archbishop could not count on any immediate armed intervention. For the moment, at least, he would be left to face alone the storm which he had raised. The best that he could now hope to effect would be to bury himself and his enemies in common ruin. He foretold his fate to the abbot, and, resisting entreaties to spend Christmas at St. Albans, went back to Canterbury, where he had still work before him which could be accomplished only in his own cathedral.

The story now turns to Henry's court in Normandy. Between Southampton and the Norman coast communications were easy and rapid; and the account of the arrival of the censured bishops, with the indignant words which burst from the king at the unwelcome news which he heard from them for the first time, is an imperfect legend in which the transactions of many days must have been epitomised.

The bishops did not leave England till the 20th or 21st of December, and before their appearance the king must have heard already not only of the excommunications and of the daring misuse of his own name, but of the armed progress to London, of the remarkable demonstration there, of the archbishop's defiance of the government, of the mission of the Abbot of St. Albans, of the threats of the priest, and of the imminent danger of a general rebellion. During the first three weeks of this December many an anxious council must have been held in the Norman court, and many a scheme talked over and rejected for dealing with this impracticable firebrand. What could be done with him? No remedy was now available but a violent one. The law could not restrain a man who claimed to be superior to law, and whose claims the nation was not prepared directly to deny. Three centuries later the solution would have been a formal trial, with the block and axe as the sequel of a judicial sentence. Ecclesiastical pretensions were still formidable under Tudors, but the State had acquired strength to control them. In our own day the phantom has been exorcised altogether, and an archbishop who used Becket's language would be consigned to an asylum. In Becket's own time neither of these methods was possible. Becket himself could neither be borne with, consistently with the existence of the civil government, nor resisted save at the risk of censures which even the king scarcely dared to encounter. A bishop might have committed the seven deadly sins, but his word was still a spell which could close the gates of heaven. The allegiance of the people could not be depended upon for a day if Becket chose to declare the king excommunicated, unless the pope should interfere; and the pope was an inadequate resource in a struggle for the supremacy of the Church over the State. It was not until secular governments could look popes and bishops in the face, and bid them curse till they were tired, that the relations of Church and State admitted of legal definition. Till that time should arrive the ecclesiastical theory was only made tolerable by submitting to the checks of tacit compromise and practical good sense.

Necessities for compromises of this kind exist at all times. In the most finished constitutions powers are assigned to the different branches of the State which it would be inconvenient or impossible to remove, yet which would cause an immediate catastrophe if the theory were made the measure of practice. The Crown retains a prerogative at present which would be fatal to it if strained. Parliament would make itself intolerable if it asserted the entire privileges which it legally possesses. The clergy in the twelfth century were allowed and believed to be ministers of God in a sense in which neither Crown nor baron dared appropriate the name to themselves. None the less the clergy could not be allowed to reduce Crown and barons into entire submission to themselves. If either churchman or king broke the tacit bargain of mutual moderation which enabled them to work together harmoniously, the relations between the two orders might not admit of more satisfactory theoretic adjustment; but there remained the resource to put out of the way the disturber of the peace.

Fuel ready to kindle was lying dry

throughout Henry's dominions. If Becket was to be allowed to scatter excommunications at his own pleasure, to travel through the country attended by knights in arms, and surrounded by adoring fools who regarded him as a supernatural being, it was easy to foresee the immediate future of England and of half France. To persons, too, who knew the archbishop as well as Henry's court knew him, the character of the man himself who was causing so much anxiety must have been peculiarly irritating. Had Becket been an Anselm, he might have been credited with a desire to promote the interests of the Church, not for power's sake, but for the sake of those spiritual and moral influences which the Catholic Church was still able to exert, at least in some happy instances. But no such high ambition was to be traced either in Becket's agitation or in Becket's own disposition. He was still the self-willed, violent, unscrupulous chancellor, with the dress of the saint upon him, but not the nature. His cause was not the mission of the Church to purify and elevate mankind, but the privilege of the Church to control the civil government, and to dictate the law in virtue of magical powers which we now know to have been a dream and a delusion. His personal religion was not the religion of a regenerated heart, but a religion of self-torturing asceticism, a religion of the scourge and the hair shirt, a religion in which the evidences of grace were to be traced not in humbleness and truth, but in the worms and maggots which crawled about his body. He was the impersonation not of what was highest and best in the Catholic Church, but of what was falsest and worst. The fear which he inspired was not the reverence willingly offered to a superior nature, but a superstitious terror like that felt for witches and enchanters, which brave men at the call of a higher duty could dare to defy.

No one knows what passed at Bayeux during the first weeks of that December. King and council, knights and nobles, squires and valets must have talked of little else but Becket and his doings. The pages at Winchester laid their hands on their dagger-hilts when the priest delivered his haughty message. The peers and gentlemen who surrounded Henry at Bayeux are not likely to have felt more gently as each day brought news from England of some fresh audacity. At length, a few days before Christmas, the three bishops arrived. Two were under the curse, and could not be admitted into the king's presence. The Archbishop of York, being only suspended, carried less contamination with him. At a council the archbishop was introduced, and produced Alexander's letters. From these it appeared not only that he and the other bishops were denounced by name, but that every person who had taken any part in the young king's coronation was by implication excommunicated also. It is to be remembered that the king had received a positive sanction for the coronation from Alexander; that neither he nor the bishops had received the prohibition till the ceremony was over; and that the prohibitory letter, which it is at least possible that the king would have respected, had been kept back by Becket himself.

The Archbishop of York still advised forbearance, and an appeal once more to Rome. The pope would see at last what Becket really was, and would relieve the country of him. But an appeal to Rome would take time, and England meanwhile might be in flames. 'By God's eyes,' said the king, 'if all are excommunicated who were concerned in the coronation, I am excommunicated also.' Some one (the name of the speaker is not mentioned) said that there would be no peace while Becket lived. With the fierce impatience of a man baffled by a problem which he has done his best to solve, and has failed through no fault of his own, Henry is reported to have exclaimed: 'Is this varlet that I loaded with kindness, that came first to court to me on a lame mule, to insult me and my children, and take my crown from me? What cowards have I about me, that no one will deliver me from this lowborn priest!' It is very likely that Henry used such words. The greatest prince that ever sat on throne, if tried as Henry had been, would have said the same; and Henry had used almost the same language to the bishops at Chinon in 1166. But it is evident that much is still untold. These passionate denunciations can be no more than the outcome of long and ineffectual deliberation. Projects must have been talked over and

rejected; orders were certainly conceived which were to be sent to the archbishop, and measures were devised for dealing with him short of his death. He was to be required to absolve the censured bishops. If he refused, he might be sent in custody to the young king, he might be brought to Normandy, he might be exiled from the English dominions, or he might be imprisoned in some English castle. Indications can be traced of all these plans; and something of the kind would probably have been resolved upon, although it must have been painfully clear also that, without the pope's help, none of them would really meet the difficulty. But the result was that the knights about the court, seeing the king's perplexity, determined to take the risk on themselves, and deliver both him and their country. If the king acted, the king might be excommunicated, and the empire might be laid under interdict, with the consequences which every one foresaw. For their own acts the penalty would but fall upon themselves. They did not know, perhaps, distinctly what they meant to do, but something might have to be done which the king must condemn if they proposed it to him,

> But being done unknown,
> He would have found it afterwards well done.

Impetuous loyalty to the sovereign was in the spirit of the age.

Among the gentlemen about his person whom Henry had intended to employ, could he have resolved upon the instructions which were to be given to them, were four knights of high birth and large estate—Sir Reginald Fitzurse, of Somersetshire, a tenant in chief of the Crown, whom Becket himself had originally introduced into the court; Sir Hugh de Morville, custodian of Knaresborough Castle, and justiciary of Northumberland; Sir William de Tracy, half a Saxon, with royal blood in him; and Sir Richard le Breton, who had been moved to volunteer in the service by another instance of Becket's dangerous meddling. Le Breton was a friend of the king's brother William, whom the archbishop had separated from the lady to whom he was about to be married on some plea of consanguinity. Sir William de Mandeville and others were to have been joined in the commission. But these four chose to anticipate both their companions and their final orders, and started alone.* Their disappearance was observed. An express was sent to recall them, and the king supposed that they had returned. But they had gone by separate routes to separate ports. The weather was fair for the season of the year, with an east wind perhaps; and each had found a vessel without difficulty to carry him across the Channel. The rendezvous was Sir Ranulf de Broc's castle of Saltwood, near Hythe, thirteen miles from Canterbury.

The archbishop meanwhile had returned from his adventurous expedition. The young king and his advisers had determined to leave him no fair cause of complaint, and had sent orders for the restoration of his wine and the release of the captured seamen; but the archbishop would not wait for the State to do him justice. On Christmas Eve he was further exasperated by the appearance at the gate of his palace of one of his sumpter mules, which had been brutally mutilated by Sir Ranulf de Broc's kinsman Robert. 'The viper's brood,' as Herbert de Bosham said, 'were lifting up their heads. The hornets were out. Bulls of Bashan compassed the archbishop round about.' The Earl of Cornwall's warning had reached him, but 'fight, not flight,' was alone in his thoughts. He, too, was probably weary of the strife, and may have felt that he would serve his cause more effectually by death than by life. On Christmas day he preached in the cathedral on the text 'Peace to men of good will.' There was no peace, he said, except to men of good will. He spoke passionately of the trials of the Church. As he drew towards an end he alluded to the possibility of his own martyrdom. He could

* Mandeville came afterwards to Canterbury, and being asked what he had been prepared to do if he had found the archbishop alive, he said 'that he would have taken the archbishop sharply to task for his attacks upon his sovereign: if the archbishop had been reasonable there would have been peace; if he had persisted in his obstinacy and presumption, beyond doubt he would have been compelled to yield.' Mandeville, indisputably, had direct instructions from the king. (*Materials*, vol. i. p. 126.)

scarcely articulate for tears. The congregation were sobbing round him. Suddenly his face altered, his tone changed. Glowing with anger, with the fatal candles in front of him, and in a voice of thunder, the solemn and absurd strangely blended in the overwhelming sense of his own wrongs, he cursed the intruders into his churches; he cursed Sir Ranulf de Broc; he cursed Robert de Broc for cutting off his mule's tail; he cursed by name several of the old king's most intimate councillors who were at the court in Normandy. At each fierce imprecation he quenched a light, and dashed down a candle. 'As he spoke,' says the enthusiastic Herbert, 'you saw the very beast of the prophet's vision, with the face of a lion and the face of a man.' He had drawn the spiritual sword, as he had sworn that he would. So experienced a man of the world could not have failed to foresee that he was provoking passions which would no longer respect his office, and that no rising in England would now be in time to save him. He was in better spirits, it was observed, after he had discharged his anathema. The Christmas festival was held in the hall. Asceticism was a virtue which was never easy to him. He indulged his natural inclinations at all permitted times, and on this occasion he ate and drank more copiously than usual.

The next day Becket received another warning that he was in personal danger. He needed no friends to tell him that. The only attention which he paid to these messages was to send his secretary Herbert and his crossbearer Alexander Llewellyn to France, to report his situation to Lewis and to the Archbishop of Sens.* He told Herbert at parting that he would see his face no more.

So passed at Canterbury Saturday, Sunday, and Monday, the 26th, 27th, and 28th of December. On that same Monday afternoon the four knights arrived at Saltwood. They were expected, for Sir Ranulf with a party of men-at-arms had gone to meet them. There on their arrival they learned the fresh excommunications which had been pronounced against their host and against their friends at the court. The news could only have confirmed whatever resolutions they had formed.

On the morning of the 29th they rode with an escort of horse along the old Roman road to Canterbury. They halted at St. Augustine's Monastery, where they were entertained by the abbot elect, Becket's old enemy, the scandalous Clarembald. They perhaps dined there. At any rate they issued a proclamation bidding the inhabitants remain quiet in their houses in the king's name, and then, with some of Clarembald's armed servants in addition to their own party, they went on to the great gate of the archbishop's palace. Leaving their men outside, the four knights alighted and entered the court. They unbuckled their swords, leaving them at the lodge, and, throwing gowns over their armor, they strode across to the door of the hall. Their appearance could hardly have been unexpected. It was now between three and four o'clock in the afternoon. They had been some time in town, and their arrival could not fail to have been reported. The archbishop's midday meal was over. The servants were dining on the remains, and the usual company of mendicants were waiting for their turn. The archbishop had been again disturbed at daybreak by intimation of danger. He had advised any of his clergy who were afraid to escape to Sandwich; but none of them had left him. He had heard mass as usual. He had received his customary floggings. At dinner he had drunk freely, observing, when some one remarked upon it, that he that had blood to lose needed wine to support him. Afterwards he had retired into an inner room with John of Salisbury, his chaplain Fitzstephen, Edward Grim of Cambridge, who was on a visit to him, and several others, and was now sitting in conversation with them in the declining light of the winter afternoon till the bell should ring for vespers.

The knights were recognised, when they entered the hall, as belonging to the old king's court. The steward invited them to eat. They declined, and desired him to inform the archbishop that they had arrived with a message

* One of his complaints, presented by the Abbot of St. Albans, had been that his clergy were not allowed to leave the realm. There seems to have been no practical difficulty.

from the Court. This was the first communication which the archbishop had received from Henry since he had used his name so freely to cover acts which, could Henry have anticipated them, would had barred his return to Canterbury for ever. The insincere professions of peace had covered an intention of provoking a rebellion. The truth was now plain. There was no room any more for excuse or palliation. What course had the king determined on?

The knights were introduced. They advanced. The archbishop neither spoke nor looked at them, but continued talking to a monk who was next him. He himself was sitting on a bed. The rest of the party present were on the floor. The knights seated themselves in the same manner, and for a few moments there was silence. Then Becket's black restless eyes glanced from one to the other. He slightly noticed Tracy; and Fitzurse said a few unrecorded sentences to him, which ended with 'God help you!' To Becket's friends the words sounded like insolence. They may have meant no more than pity for the deliberate fool who was forcing destruction upon himself.

Becket's face flushed. Fitzurse went on: 'We bring you the commands of the king beyond the sea; will you hear us in public or in private?' Becket said he cared not. 'In private, then,' said Fitzurse. The monks thought afterwards that Fitzurse had meant to kill the archbishop where he sat. If the knights had entered the palace, thronged as it was with men, with any such intention, they would scarcely have left their swords behind them. The room was cleared, and a short altercation followed, of which nothing is known save that it ended speedily in high words on both sides. Becket called in his clergy again, his lay servants being excluded, and bade Fitzurse go on. 'Be it so,' Sir Reginald said. 'Listen then to what the king says. When the peace was made, he put aside his complaints against you. He allowed you to return, as you desired, free to your see. You have now added contempt to your other offences. You have broken the treaty. You have allowed your pride to tempt you to defy your lord and master to your own sorrow. You have censured the bishops by whose ministration the prince was crowned. You have pronounced an anathema against the king's ministers, by whose advice he is guided in the management of the Empire. You have made it plain that if you could you would take the prince's crown from him. Your plots and contrivances to attain your ends are notorious to all men. Say, then, will you attend us to the king's presence, and there answer for yourself? For this we are sent.'

The archbishop declared that he had never wished any hurt to the prince. The king had no occasion to be displeased if crowds came about him in the towns and cities after having been so long deprived of his presence. If he had done any wrong he would make satisfaction, but he protested against being suspected of intentions which had never entered his mind.

Fitzurse did not enter into an altercation with him, but continued: 'The king commands further that you and your clerks repair without delay to the young king's presence, and swear allegiance, and promise to amend your faults.'

The archbishop's temper was fast rising. 'I will do whatever may be reasonable,' he said, 'but I tell you plainly the king shall have no oaths from me, nor from any one of my clergy. There has been too much perjury already. I have absolved many, with God's help, who have perjured themselves.* I will absolve the rest when He permits.'

'I understand you to say that you will not obey,' said Fitzurse; and went on in the same tone: 'The king commands you to absolve the bishops whom you have excommunicated without his permission (*absque licentiâ suâ*).'

'The pope sentenced the bishops,' the archbishop said. 'If you are not pleased, you must go to him. The affair is none of mine.'

Fitzurse said it had been done at his instigation, which he did not deny; but he proceeded to reassert that the king had given him permission. He had complained at the time of the peace of the injury which he had suffered in the coronation, and the king had told him that he might obtain from the pope

* He was alluding to the bishops who had sworn to the Constitutions of Clarendon.

any satisfaction for which he liked to ask.

If this was all the consent which the king had given, the pretence of his authority was inexcusable. Fitzurse could scarce hear the archbishop out with patience. 'Ay, ay!' said he; 'will you make the king out to be a traitor, then? The king gave you leave to excommunicate the bishops when they were acting by his own order! It is more than we can bear to listen to such monstrous accusations.'

John of Salisbury tried to check the archbishop's imprudent tongue, and whispered to him to speak to the knights in private; but when the passion was on him, no mule was more ungovernable than Becket. Drawing to a conclusion, Fitzurse said to him: 'Since you refuse to do any one of those things which the king requires of you, his final commands are that you and your clergy shall forthwith depart out of this realm and out of his dominions, never more to return.* You have broken the peace, and the king can not trust you again.'

Becket answered wildly that he would not go—never again would he leave England. Nothing but death should now part him from his church. Stung by the reproach of ill-faith, he poured out the catalogue of his own injuries. He had been promised restoration, and instead of restoration he had been robbed and insulted. Ranulf de Broc had laid an embargo on his wine. Robert de Broc had cut off his mule's tail, and now the knights had come to menace him.

De Morville said that if he had suffered any wrong he had only to appeal to the council, and justice would be done.

Becket did not wish for the council's justice. 'I have complained enough,' he said; 'so many wrongs are daily heaped upon me that I could not find messengers to carry the tale of them. I am refused access to the court. Neither one king nor the other will do me right. I will endure it no more. I will use my own powers as archbishop, and no child of man shall prevent me.'

'You will lay the realm under interdict, then, and excommunicate the whole of us?' said Fitzurse.

'So God help me,' said one of the others, 'he shall not do that. He has excommunicated over-many already. We have borne too long with him.'

The knights sprang to their feet, twisting their gloves and swinging their arms. The archbishop rose. In the general noise words could no longer be accurately heard. At length the knights moved to leave the room, and, addressing the archbishop's attendants, said, 'In the king's name we command you to see that this man does not escape.'

'Do you think I shall fly then?' cried the archbishop. 'Neither for the king nor for any living man will I fly. You cannot be more ready to kill me than I am to die. . . . Here you will find me,' he shouted, following them to the door as they went out, and calling after them. Some of his friends thought that he had asked De Morville to come back and speak quietly with him, but it was not so. He returned to his seat still excited and complaining.

'My lord,' said John of Salisbury to him, 'it is strange that you will never be advised. What occasion was there for you to go after these men and exasperate them with your bitter speeches?' You would have done better surely by being quiet and giving them a milder answer. They mean no good, and you only commit yourself.'

The archbishop sighed, and said, 'I have done with advice. I know what I have before me.'

It was four o'clock when the knights entered. It was now nearly five; and unless there were lights the room must have been almost dark. Beyond the archbishop's chamber was an ante-room, beyond the ante-room the hall. The knights, passing through the hall into the quadrangle, and thence to the lodge, called their men to arms. The great gate was closed. A mounted guard was stationed outside with orders to allow no one to go out or in. The knights threw off their cloaks and buckled on their

* 'Hoc est præceptum regis, ut de regno et terrâ quæ ipsius subjacet imperio cum tuis omnibus egrediaris; neque enim pax erit tibi vel tuorum cuiquam ab hac die, quia pacem violâsti.' These remarkable words are given by Grim, who heard them spoken. After the deliberate fraud of which Becket had been guilty towards the pope in suppressing the inhibitory letter addressed to the Archbishop of York, Alexander might perhaps have been induced at last to approve of such a measure.

swords. This was the work of a few minutes. From the cathedral tower the vesper bell was beginning to sound. The archbishop had seated himself to recover from the agitation of the preceding scene, when a breathless monk rushed in to say that the knights were arming. 'Who cares? Let them arm,' was all that the archbishop said. His clergy were less indifferent. If the archbishop was ready for death they were not. The door from the hall into the court was closed and barred, and a short respite was thus secured. The intention of the knights, it may be presumed, was to seize the archbishop and carry him off to Saltwood, or to De Morville's castle at Knaresborough, or perhaps to Normandy. Coming back to execute their purpose, they found themselves stopped by the hall door. To burst it open would require time; the ante-room between the hall and the archbishop's apartments opened by an oriel window and an outside stair into a garden. Robert de Broc, who knew the house well, led the way to it in the dark. The steps were broken, but a ladder was standing against the window, by which the knights mounted, and the crash of the falling casement told the fluttered group about the archbishop that their enemies were upon them. There was still a moment. The party who entered by the window, instead of turning into the archbishop's room, first went into the hall to open the door and admit their comrades. From the archbishop's room a second passage, little used, opened into the south-west corner of the cloister, and from the cloister there was a way into the south transept of the cathedral. The cry was, 'To the church.' There at least there would be immediate safety.

The archbishop had told the knights that they would find him where they left him. He did not choose to show fear, or he was afraid, as some thought, of losing his martyrdom. He would not move. The bell had ceased. They reminded him that vespers had begun, and that he ought to be in the cathedral. Half-yielding, half-resisting, his friends swept him down the passage into the cloister. His cross had been forgotten in the haste. He refused to stir till it was fetched and carried before him as usual. Then only, himself incapable of fear, and rebuking the terror of the rest, he advanced deliberately to the door into the south transept.* His train was scattered behind him, all along the cloister from the passage leading out of the palace. As he entered the church cries were heard from which it became plain that the knights had broken into the archbishop's room, had found the passage, and were following him. Almost immediately Fitzurse, Tracy, De Morville, and Le Breton were discerned, in the dim light, coming through the cloister in their armor, with drawn swords, and axes in their left hands. A company of men-at-arms was behind them. In front they were driving before them a frightened flock of monks.

From the middle of the transept in which the archbishop was standing a single pillar rose into the roof. On the eastern side of it opened a chapel of St. Benedict, in which were the tombs of several of the old primates. On the west, running, of course, parallel to the nave, was a lady chapel. Behind the pillar steps led up into the choir, where voices were already singing vespers. A faint light may have been reflected into the transept from the choir tapers, and candles may perhaps have been burning before the altars in the two chapels—of light from without through the windows at that hour there could have been none. Seeing the knights coming on, the clergy who had entered with the archbishop closed the door and barred it. 'What do you fear?' he cried in a clear, loud voice. 'Out of the way, you cowards! The Church of God must not be made a fortress.' He stepped back and reopened the door with his own hands, to let in the trembling wretches who had been shut out among the wolves. They rushed past him, and scattered in the hiding-places of the vast sanctuary, in the crypt, in the gal-

* Those who desire a more particular account of the scene about to be described should refer to Dean Stanley's essay on the murder of Becket, which is printed in his *Antiquities of Canterbury*. Along with an exact knowledge of the localities and a minute acquaintance with the contemporary narratives, Dr. Stanley combines the far more rare power of historical imagination, which enables him to replace out of his materials an exact picture of what took place.

leries, or behind the tombs. All, or almost all, even of his closest friends, William of Canterbury, Benedict, John of Salisbury himself, forsook him to shift for themselves, admitting frankly that they were unworthy of martyrdom. The archbishop was left alone with his chaplain Fitzstephen, Robert of Merton his old master, and Edward Grim, the stranger from Cambridge—or perhaps with Grim only, who says that he was the only one who stayed, and was the only one certainly who showed any signs of courage. A cry had been raised in the choir that armed men were breaking into the cathedral. The vespers ceased; the few monks assembled left their seats and rushed to the edge of the transept, looking wildly into the darkness.

The archbishop was on the fourth step beyond the central pillar ascending into the choir when the knights came in. The outline of his figure may have been just visible to them, if light fell upon it from candles in the lady chapel. Fitzurse passed to the right of the pillar, De Morville, Tracy, and Le Breton to the left. Robert de Broc and Hugh Mauclerc, another apostate priest, remained at the door by which they entered. A voice cried 'Where is the traitor? Where is Thomas Becket?' There was silence; such a name could not be acknowledged. 'Where is the archbishop?' Fitzurse shouted. 'I am here,' the archbishop replied, descending the steps, and meeting the knights full in the face. 'What do you want with me? I am not afraid of your swords. I will not do what is unjust.' The knights closed round him. 'Absolve the persons whom you have excommunicated,' they said, 'and take off the suspensions.' 'They have made no satisfaction,' he answered; 'I will not.' 'Then you shall die as you have deserved,' they said.

They had not meant to kill him—certainly not at that time and in that place. One of them touched him on the shoulder with the flat of his sword, and hissed in his ears, 'Fly, or you are a dead man.' There was still time; with a few steps he would have been lost in the gloom of the cathedral, and could have concealed himself in any one of a hundred hiding-places. But he was careless of life, and he felt that his time was come. 'I am ready to die,' he said. 'May the Church through my blood obtain peace and liberty! I charge you in the name of God that you hurt no one here but me. The people from the town were now pouring into the cathedral; De Morville was keeping them back with difficulty at the head of the steps from the choir, and there was danger of a rescue. Fitzurse seized him, meaning to drag him off as a prisoner. He had been calm so far; his pride rose at the indignity of an arrest. 'Touch me not, thou abominable wretch!' he said, wrenching his cloak out of Fitzurse's grasp. 'Off, thou pander, thou!' * Le Breton and Fitzurse grasped him again, and tried to force him upon Tracy's back. He grappled with Tracy and flung him to the ground, and then stood with his back against the pillar, Edward Grim supporting him. Fitzurse, stung by the foul epithet which Becket had thrown at him, swept his sword over him and dashed off his cap. Tracy, rising from the pavement, struck direct at his head. Grim raised his arm and caught the blow. The arm fell broken, and the one friend found faithful sank back disabled against the wall. The sword, with its remaining force, wounded the archbishop above the forehead, and the blood trickled down his face. Standing firmly, with his hands clasped, he bent his neck for the death-stroke, saying in a low voice, 'I am prepared to die for Christ and for His Church.' These were his last words. Tracy again struck him. He fell forward upon his knees and hands. In that position Le Breton dealt him a blow which severed the scalp from the head and broke the sword against the stone, saying, 'Take that for my Lord William.' De Broc or Mauclerc—the needless ferocity was attributed to both of them—strode forward from the cloister door, set his foot on the neck of the dead lion, and spread the brains upon the pavement with his sword's point. 'We may go,' he said; 'the traitor is dead, and will trouble us no more.'

Such was the murder of Becket, the echoes of which are still heard across seven centuries of time, and which, be the final judgment upon it what it may,

* 'Lenonem appellans.' In extreme moments Becket was never able to maintain his dignity.

has its place among the most enduring incidents of English history. Was Becket a martyr, or was he justly executed as a traitor to his sovereign? Even in that supreme moment of terror and wonder opinions were divided among his own monks. That very night Grim heard one of them say, 'He is no martyr, he is justly served.' Another said, scarcely feeling, perhaps, the meaning of the words, 'He wished to be king and more than king. Let him be king, let him be king.' Whether the cause for which he died was to prevail, or whether the sacrifice had been in vain, hung on the answer which would be given to this momentous question. In a few days or weeks an answer came in a form to which in that age no rejoinder was possible, and the only uncertainty which remained at Canterbury was whether it was lawful to use the ordinary prayers for the repose of the dead man's soul, or whether, in consequence of the astounding miracles which were instantly worked by his remains, the pope's judgment ought not to be anticipated, and the archbishop ought not to be at once adored as a saint in heaven.—*The Nineteenth Century.*

LA GRANDE DAME DE L'ANCIEN RÉGIME.

BY LADY AUGUSTA CADOGAN.

THE beginning of this century witnessed the gradual extinction of a great social power. It has died out, and its place knows it no more.

La Grande Dame s'en va, wrote a French author about the year 1830; *le milieu respirable pour elle n'existant plus; elle n'a pas faire école.* He was right; *la Grande Dame* is extinct. And not only in France, but in English society almost simultaneously she disappeared. Whether from the same cause—that the elements necessary to her existence are wanting here also—or whether, according to the inflexible laws of supply and demand, she ceased to exist when the restlessness of modern life no longer required her calm, obstructive influence, I leave to wiser heads to determine. Enough to note the fact that she has departed, and left no successors. I trust that I shall not be misunderstood to imply that our society has not still, notwithstanding the debasing influences of slang and fastness, numerous specimens of the high-bred lady "*of the best class, and better than her class,*" who has ever been the boast of our aristocracy, and remains to bear her own witness to her own days. Those who are now gone, but in my youth were still living and retained in their manners the traditions of the old school, were so numerous and well-known that to name some would be invidious, to omit none impossible, without trenching on the sacredness of private life. Still, there was *one* whom I may be forgiven for naming, because her political existence and *rôle* have marked her place in the history of her times; one who will ever be to me the type of the perfect lady, everywhere recognised, whatever her outward symbols, by that inward grace of good breeding, which in Horace Walpole's famous words *is good feeling.* Who that ever knew her does not remember the graceful hostess, whose house the most insignificant never left without feeling he had received an individual welcome, while the familiar word or jest distinguished the friend or *habitué?* She who had for all the kind word, the happy phrase, yet whose gentle dignity kept aloof any risk of the forwardness which might have been feared in a society as mixed as that which the interests of the Liberal party obliged her to receive. She who to her latest day reigned over society by her exquisite tact even more than by her position; and gained all hearts by that irresistible charm which sprang from the well of kindness in her own. But the exigencies of the society in which she played so prominent a part had effaced in her the traditions of her youthful days. Between the type she represented and that of the *Grande Dame de l'Ancien Régime* there is a great gulf fixed by national habits and character. Lady Palmerston, under fostering circumstances, might live again; but the *Grande Dame* was an anomaly: she is gone for ever.

To attempt to trace out this dissimi-

larity and its causes would require an abler pen than mine, a profound knowledge of the social history of the past century in both countries, and, above all, the risk of entering on a subject treated by master minds of the past generation, and in this by De Tocqueville, Prévost Paradol, Henri Taine, and many other celebrated writers. I wish carefully to avoid any national comparisons, and simply try to fix the recollections of my earliest youth, passed entirely in Paris in close intimacy with many of the families representing the greatest names in French history. Thus I became better acquainted with their domestic life, with the tone of their very restricted intimate circle, than was perhaps the case with any English in the days succeeding the Restoration, when the soreness of recent defeat had just succeeded the privations of the Continental Blocus, and the name of England was with few exceptions odious to all French ears. It happened in our case that amongst the noble *émigrés* returned from England my parents had some personal friends, and a family connection in the Faubourg St. Germain, and thus saw them in their own homes, a favor seldom accorded to strangers. We children continued playments of our still older friends, the children of the Orleans family, which gave us a foot in both camps—for opposite camps they were. The Duc d'Orleans —tolerated from his position as *premier Prince du sang*, and until the birth of the Duc de Bordeaux, heir to the Crown—was looked upon with distrust by the Court and the noble Faubourg as the son of Egalité, the pupil of Madame de Genlis, the Swiss schoolmaster, the American democratic wanderer, the bold advocate of the political offender. The well-known ambition and influence of his sister, Madame Adelaide, added to this unjust distrust, which not even respect for his angelic wife could conquer. A king's daughter, a Bourbon, aunt of the young Duchess de Berri, who was tenderly attached to her,—such claims as these could not be wholly ignored by the Court and its followers; but the gloomy Duchesse d'Angoulême, who had never forgiven the murder of her parents, naturally kept aloof from the Duc d'Orleans, and only the necessary intercourse took place between the Court and the Palais Royal. The liberal education which Louis Philippe gave his sons, sending them to walk daily, satchel on back, to the Collége de France, to pursue their studies in common with boys of all classes, went counter to all their ideas. The brilliant society of the Palais Royal and Neuilly, where everything distinguished in arts, literature, and even finance, was entertained with the most princely hospitality, was, by its very contrast, equally distasteful to the gloomy, ascetic Court. The Duchesse d'Orleans, adored by all who approached her, lived but for her husband and her beautiful young family, in whom her somewhat southern piety counteracted the liberal tendencies of their education. She cultivated in them religious feelings. She animated them with enthusiastic loyalty to the throne. I remember hearing that when the guns were firing for the birth of the first child of the Duchesse de Berri, the young Duc de Chartres, then between eight and nine years old, sat intently listening for the eventful twenty-first gun (which indicated the birth of a prince), saying, *Silence! j'écoute si c'est mon roi, ou ma femme*, unconscious of anxiety for the throne which hung on the balance. Such was the state of parties in 1823, when I first recollect the families of whom I shall now speak.

It is very remarkable how little, although only separated by that narrow Channel passed daily by thousands, how imperfectly we know *good* French society. We have our preconceived notions, our judgments formed on the writings of a certain class of French novelists, who because they write about comtesses and duchesses, we fancy must know them. We in England may safely trust to the novels of the late Lord Lytton, Lord Beaconsfield, Mr. Whyte Melville, George Eliot, Mrs. Oliphant, Thackeray, Lady G. Fullerton, and a few others, to give a foreigner a sufficiently accurate idea of life on the higher rungs of the ladder to which they mostly belong. But it is not so in the France of modern days, where writers do not belong to the upper classes, or do not write novels. Some memoirs written by themselves, but printed for private circulation only, could alone give an idea of a class to which in our appreciation of their home life and domestic virtues I fear we

do but scant justice. I, who have seen them in the bosom of their families, who have received from these, the last of their social type, constant kindness, and cordial reception should indeed feel proud and happy, could my simple but faithful witness serve to dispel one erroneous impression, or conquer one unjust prejudice against those I early learnt to love and respect.

There were other reasons besides the natural distaste for the English to account for so few of them having been admitted into the intimacy of French families. All foreigners, *accueillant* as they are to strangers in society, are far more chary than we are of admitting them into domestic life, partly because, owing to the spoliations of the Revolution, and the new laws of division of property, many of the great families were poor, partly that "hugger mugger" is the only term to express the life of a French family, even many of the greatest, in those days when it was the custom for all the different *ménages* composing it to live under one roof. These ancestral houses, *Hôtels* as they were called, were mostly situated in the Faubourg St. Germain, where some of them are still to be seen spared by the Revolution—although more have perished in the suicidal fires of the Commune. Some streets, as the Rue de Lille, Rue de l'Université, Rue St. Dominique, were entirely composed of these lordly elevations, with their grand old trees towering over the high wall which separated them from the quiet street they overshadowed, to which no shops brought traffic or noise. It was difficult to realise that this was the bustling Paris whose deafening roar and whirl of excitement you had left on the Boulevard but a few minutes before. In this wall the entrance gate, called the Porte Cochère, so gigantic that you wondered how easily the porter swung it on its circular hinges, admitted carriages; the foot-passengers entering by a small door cut in the large one, as in some of our own old houses. These hotels were immense; none of our largest houses in London, except Burlington House before its alteration, give an idea of them. You drove into a large court, round which the house was built, a peristyle in the centre. The garden front on the ground and first floors was devoted to the heads of families and to reception; the second floor, and the two sides of the court, were divided into innumerable apartments with *entresols;* these although low-pitched, were roomy, and in the clear sky and light air of Paris had none of the stuffy darkness which would be their lot in London. That they are pleasant abodes enough any one who has enjoyed the *entresol* apartment at the Hotel Bristol will testify. In these were lodged the younger branches of the family, the tutor, M. l'Abbé, the secrétaire, and the hangers-on—their name was legion. As the sons and daughters grew up and married, each young couple took an apartment in the caravanserai of one or other paternal abode. There could not be a separate kitchen to each, therefore from mingled motives of economy and a wish to keep a due watch and hold over the young couple, all had their meals in common in the apartment of the head of the house, excepting the morning *café*, which was taken by each person when and where they liked. There is still in some French houses of my acquaintance a sort of buttery, where, between the hours of eight and nine, an unrestricted supply of coffee, milk, and bread in the rough, but excellent in its kind, can be had; served on white marble slabs, cleaner and less expensive than tablecloths. This arrangement saves time, as each servant comes at the hour most convenient.

Between eleven and twelve came the *déjeuner*, which we should call luncheon. Often have I assisted with my young companions at these repasts, where, with an eye as keen as any at the table, the great-grandmother presided over four generations, beginning with her own already aged sons or daughters, and ending with the baby in its high chair attended by its Normande nurse, in her fly cap, feeding it with broth out of a glass—a very nasty-looking proceeding, by the by. At the top of the table near the lady sat the old friend, who, according to invariable custom, came on a certain day of the week—his other days being similarly filled up at other hospitable houses. Then some relation who had in poverty found an asylum with the head of the house. The *lectrice* or companion of the old lady, M. l'Abbé,

the friend and counsellor of the family; interspersed with them the married sons and daughters; the boys with their tutor; rarely the men of the family, at least the young ones, but all the children. The *déjeuner* was good, but plain; soup, cutlets (without sauce), filets of beef with fried potatoes, omelettes and cheese, of which an immense variety is eaten in France, and fruit. The dinner, at six o'clock, was a repetition of the *déjeuner* minus the baby and its broth, and plus fish, *entrées*, and sweets, as well as the men of the family, who were often out in the morning, receiving in friendly houses the same *sans façon* hospitality they left in their own. Still it would have been difficult and inconvenient to invite strangers to such unceremonious meals, and there being no schoolroom table (because there were no schoolrooms), it was impossible to break up the heterogeneous assemblage except on great gala occasions. The result was that in those days no, or at least, very few, French families gave dinners.

After the *déjeuner* and a visit to *Bonnemaman*, as the grandmother is prettily called in French, when we were duly presented and given the freedom of the house in torrents of *mon bijou, charmante, délicieuse*, duly distributed to us all with laudable impartiality, and accompanied by *pastilles de chocolat*, which I appreciated much more, we were dismissed to the garden—not the miserable strip of modern Paris (when it has one), but shade in summer, sunny walks in winter, and space enough in those airy quarters of the town to dispense with going out of its walls for daily exercise. In those days there were few open carriages, fewer still with one horse; and the coachman and pair of fat old horses were kept chiefly for evening, or for the necessary work of the day. The young women drove *au Bois* with their husbands in cabriolets or curricles, which came from England, and were beginning to be a fashion. French women, as a rule, walk less, but live more in the open air than we do. In fine weather they sat almost entirely in their gardens, reading, writing, working, many days never going out of it, except *à la messe* in the morning to some small church close by, which was the almost universal custom of the higher classes. French servants, shopkeepers, in general all women of the lower classes, both town and country, sit outside their doors at their work whenever the weather allows of it. They are to be seen at the door of the palace as of the cottage, or under the *porte cochère* in the shade, carding mattresses, shelling peas, dressing their children, working, or spinning; not a moment will they be indoors that they can help. Sometimes we children were all taken to the Tuileries by the *bonne* of the family. There, in a sunny corner, sheltered by the terraces overlooking the Place de la Concorde, and named from its warmth *La petite Provence*, we exercised ourselves at the skipping-rope with a proficiency I look back to with admiration, double twirls in one leap being highly applauded by the critical audience of fly-caps—each with a fusty-looking baby in her arms—and wooden-legged Invalides, its usual frequenters, whose appreciation we much coveted. There were also some *gaufres*, a sort of pancake, thin and crisp, made instantaneously in an iron shovel on a little charcoal stove, which, by permission of the authorities, was allowed in one corner of the delectation of the fly-caps and their charges; also a honey wafer, called *plaisirs*, and fresh milk were to be had here, as in all public promenades at Paris. These were provided for by a few sous put into our tiny pockets with a lump of bread, for the *goûter*, a sort of nondescript meal, of any trash obtainable, which French children have as a stop-gap between *déjeuner* and dinner. Alas! I have since seen my poor *petite Provence* filled with savage Turcos and Zouaves instead of kind old Invalides, and camp-fires replacing the little *gaufre* stove of my childish days.

The old custom of bringing up girls in convents was fast dying out. Many of our young friends were educated at home, or, at all events, only went to a convent the year preceding and following their first communion, a time always with them spent in retirement. If at home, they did not come down when there was company, that their minds should not be distracted from the solemnity of the act. There are, or at least there were, no governesses in these families. If the daughters were brought up at home, they, and indeed the sons, also,

were so much with their mothers, that no assistance but that of masters and the old *bonne* who had nursed them, was required.

French women are in general devoted mothers, seldom leaving their children, and expending upon them what the poet calls "the strong necessity of loving," to which many of their marriages formerly gave little aliment. Amongst them is many a mute inglorious Sévigné, who lacked not Sévigné's feelings for her daughter, exaggerated as they may seem to us, but only the power of expressing them. Their time is much more their own in the day than with us, because morning visiting does not exist, none but a sister or an intimate friend is admitted before the evening, which is considered the time for society; they were therefore free to attend to their favorite pursuits and studies, or to their children's education. They did not formerly, as we do, and they do now, go to the seaside, travel, pay country visits. The great families had magnificent châteaux, but these had mostly been *saccagé* at the Revolution, and there were no means to refurnish them; some were very far off, and a journey to Touraine or Provence, before the days of railways, was too heavy an expense. They often preferred leaving them unoccupied, and, if rich enough, had villas on the beautiful hills of St. Germain, or Meudon, or even nearer Paris, where within a walk from the Champs Elysées were some charming country houses, with farms and green fields, now covered with streets and shops. In one of these beautiful residences, Le Val, in the Forêt de St. Germain, belonging to the old Princesse de Poix, I passed many never-to-be-forgotten days. The family consisted of the blind grandmother, looking like a Rembrandt stepped out of its frame, and her two sons, the eldest a widower with an only child; she herself a widow after a year's marriage, her young husband buried under the snows of the Russian retreat. Celebrated over Europe for her wit and charm, she refused the most brilliant offers of marriage to devote herself to her father and her only child, a daughter. The second son, one of those rare characters of unostentatious piety, living but for the good he could do in this world of suffering, entirely occupied with social questions on the improvement of the lower classes, to which he devoted his life, the best of sons, of fathers, of husbands. His wife, a Talleyrand, holding by her birth not more than by her kindness and virtues, a position which led even the Great Emperor to press her acceptance of the post of Grande Maîtresse to Marie Louise; and caused her to take the same post with the young Duchesse de Berri at the Restoration, which she retained in society as long as she lived. Their mantle descended on the four bright handsome children, with whom we roamed the beautiful forest. The eldest son took a prominent part in political and utilitarian life in his own province. The second was well-known as a diplomate in England. To name the daughter, Mrs. S. Standish, is but to recall virtues, charms, and talents, celebrated in the literary and social world of her own and her adopted country. A family of perfect affection, of unpretending goodness; whom to know was to love. It is of such as these (and they were not so unique in that society) that we loftily shrug our insular shoulders, and thank Heaven we are not as these foreigners are.

We often pronounce French women frivolous in their pursuits, reading, and lives; this I think an unjust judgment. What I saw of French women in former days has led me to the contrary conclusion; I do not speak of the present generation, but let us see what is the witness of French history as far back as the reign of *Le Grand Monarque*. In that most charming of books, Mdme. de Sévigné's Letters, we find that ladies read and understood Descartes' philosophy, the theological disputes of the Jansenists and the Port Royal, Laplace's Astronomy, the writings of Pascal, Latin and even Greek authors, history in its driest forms, algebra, &c. See the list she sends her daughter of the books she provides herself, and *le bien bon*, l'Abbé de Coulanges for a rainy week *aux Rochers*. It is like the *menu* of a first-class competitive examination. It includes St. Augustine, Bourdaloue, and Massillon as pious reading; as light reading, *pour nous délasser*, Dante and Tasso in Italian, and Delisle's translation of Virgil; as fiction, *Le Grand Cyrus*, and some works

by the *bel esprits* of the Hôtel de Rambouillet, whom Molière was already flagellating in *Les Précieuses Ridicules*, but whose influence even Mdme. de Sévigné's sound sense had not shaken off.

Absurd as was the use women in those days made of their learning, the education must have been of a high order which enabled them to hold such dialogues as those satirized by Molière in the *Femmes Savantes*.

From this, and from the perfect scene in which the bluestocking dismisses her cook, because her language is not that of Vaugelas (the great grammarian of the period), as well as from the plot of *Les Précieuses Ridicules*, where the valets personate their masters and talk the pedantic jargon of the period, it is evident that the servants of these *femmes savantes* participated in the studies and pretensions of the house. This epoch of bad taste passed away; but all French memoirs, down to the Revolution of '92, prove that the education of women of the highest rank embraced even abstruse studies. History tells us that the Duchesse du Maine, one of the most beautiful and dissipated women of the Court of Louis Quinze, herself collated, in secret from the Bibliothèque du Roi, the arguments and legal precedents to establish her husband's right to the regency. In the correspondence of the Comtesse de Sabran, a beautiful young widow in the days of Louis Seize, with the Chevalier de Boufflers, to whom she was engaged, and afterwards married, we find her reproaching him for not writing to her in Latin, telling him that he is so severe a critic she dare not send him her translation of Pythagoras and of the Ode of Claudius on Old Age. She is reading the letters of Abelard and Eloisa in Latin, with such pleasure, that she is translating some of them. She explains to him an effect of light which puzzled him, adding that she had gone through three courses of lectures on chemistry and physics in her life, and retained them. In the journal of her daily life, she says: "I get up at seven, I write and study till eleven, then after *déjeuner* I paint until dinner time at a full-length portrait of La Comtesse Auguste de la Marck"—the Princesse d'Arenberg (her intimate friend), who shared these studies. She is also painting a large historical picture. All this is intermixed with accounts of the *fêtes* she went to, and in the most womanly and tender letters. I saw this lady at an advanced age; she died as late as 1833.

In the last century, the Grande Dame was invariably educated at a convent. It is a mistake to suppose her education was neglected. The nuns, it is true, taught little besides the fairy needlework, in which they excelled, and the reverential, if somewhat narrow and childish, religion of which the reverence at least remained with their pupils through life. No woman, at least in noble society, was outwardly negligent of the observances of the Church, and to speak of them even slightingly would have been esteemed the acme of bad taste. True, some women of the great families during the few years preceding the Revolution, led away by the genius of Voltaire and his school, and by the influence of the times, abjured in great measure their early religious beliefs; but these were exceptions, and in most cases they returned in their old age to the faith instilled into their youthful hearts. Beside this training from the nuns, they received from professors of almost every branch of literature (too often neglected with us) a solid education *des études sérieuses* continued when they left the convent by M. l'Abbé, their brother's tutor, and far different from the light reading and showy accomplishments of these days. This lasted even beyond their early marriage, which was not considered as emancipating them from study.

The Revolution, with its horrors, or a life of exile and wandering, must have interrupted the studies of the Grande Dame as I knew her in my childish days. I was not of an age to judge of her in that respect, except from what I have since heard from her grandchildren. Those that I recollect up to 1830, when we finally left Paris, a few months before the second revolution, were some of them between seventy and eighty, the survivors of '93. Some had passed through the prisons waiting daily for death, and saved only by Robespierre's fall; others had seen parents and husbands torn from them to the scaffold. Others, mere children at that fearful time, had been rescued by devoted nurses, or with their

parents had found timely refuge in England or Germany. One there was, who, when but ten years old, had watched from the window of her home the *fête* for the marriage of the Dauphin and Marie Antoinette (May 1770), and had witnessed the fearful disaster by which so many perished on that day, almost on the spot where the guillotine was to stand twenty years later. She had episodes of her court life after marriage to relate to us, of her hairbreadth escapes, of her flight to exile. There was the old Princesse de V——x, who passed through the *Terreur*, shut up in one room in her Paris home (whence she had refused to emigrate), watched by two *gardes nationaux*, her life only saved by an unknown protector in the revolutionary tribunal. Many returned when the danger was passed, to resume, though impoverished, their former existence, amid the wreck of families and fortunes which they had refused to retrieve by adherence to the Empire. Others returned only at the Restoration, having lived in the narrow circle of the *émigrés* unaltered in ideas, *n'ayant rien appris, et rien oublié*, and bringing with them the traditions and manners of bygone days. Some would still call Napoleon M. Bonaparte, and would date in 1814 "*20ème année du règne de Louis XVIII.*" It is said that they even altered history. I have been told that a printed history exists which states that S. M. Louis XVIII. gave the command of his armies and the government of his kingdom to M. Bonaparte, not liking after his brother's death to return to France for some years.

There is wonderful vitality in aged French women, particularly of the noble class—not only are they as a rule long-lived, but the vigor of their mind and faculties remains intact to advanced age, and strengthens the tenacity of habits and ideas which was a characteristic of the Grande Dame. She came from exile, after ten or fifteen years passed, perhaps in England, amongst a race different in all things from her own, and with many of whom she was on even affectionate terms. But not one thought, not one prejudice was modified; as a drop of oil cast on a stream will be tossed about, surrounded, pressed upon, but never mingle with the water, she remained in the midst of a world of progress, her own unaltered self.

They were noble old women; I remember still the sort of awe with which I looked on those venerable relics of a past already become history. Differing in character, as all human beings differ, and some of them twenty years younger than the others, there were still amongst them some general features of resemblance, a certain strange assemblage of contrasts. What struck you first about her (and which still distinguishes French ladies) was her *ton* and language—always strictly grammatical, and pure French, but startling you by its almost brusque *bonhomie*, its utter absence of all affectation or self-consciousness, homely in expression, but never trivial; above all things she eschewed fine words, and stilted phrases. *L'épicier dit mon épouse, le roi dit ma femme*, was the principle on which she spoke; but no vulgarisms, no slang or cant ever sullied her lips; she spoke well and pithily, not unfrequently with short, sharp sentences, *qui emportaient la pièce*, if she happened to be offended. She spoke with decision, with the authority of one who knows that she is respectfully listened to. Her manner was generally perfect in its ease and adaptation to the person addressed; in its natural unstudied felicity of expression; illustrating the axiom that to conceal art is the acme of art. French women are fond of talking; it is no effort to them; the shyness which in us English so often destroys the grace and power of speaking is, if it exists, so combated in their earliest years that it is unknown to them. With her simple *grandes manières* perfectly civil and well bred, she knew how to draw the line—elaborately, ceremoniously civil to those whom she did not wish to admit within her circle, or encourage to return; while with her own intimates she gladly relapsed into the familiar snuff-taking, the not over particular talk her soul rejoiced in (for she called a spade a spade if she had occasion to mention it), or topics of conversation perhaps not in general use with us; such she considered it affectation to avoid. But it was all said in such grand simplicity, so evidently without any idea of shocking her hearers—or indeed any idea that it *could* or *ought*

to shock them—that you could not feel annoyed. She had mostly mother wit, and those equable spirits and cheerful temperament which alone could have carried her through the fearful scenes of her childhood, or the poverty and privation of her youth and middle age. The courage which had supported her mother on the scaffold had not deserted her, she had gone through what would have killed women of another stamp. Reverses and dangers found her undaunted, ready as ever to risk life and fortune for her sovereign or her "idea," and rearing her children to the same devoted loyalty.

The second Vendée proved that they were the equals of the Lescures and La Rochejaquelins of the first. To their children these women were tenderly and even passionately attached; but the tone of maternal authority—whatever the age—of decision in all family matters, and of undisputed sovereignty at home, never ceased but with life. A prominent feature in them was the strength and constancy of their friendship, and this has been a trait in French character in all times. Their time, their house, their fortune if required, is devoted to their friends; they will leave all to nurse them in illness, to console them in sorrow. Mme. de Staël, in *L'Influence des Passions*, places friendship in the rank of a passion and devotes to it one of her most eloquent chapters. These friendships used to be carried on without interruption from the convent days. One of them told me that for sixty years she and her friend had never failed to meet on the same anniversary and spend a month or two together, although dwelling a long distance apart. Proud of birth rather than of rank or social position—which as she never went out of her house she only valued for the court it brought her—she loved to recall the *hauts faits* of her ancestors and the history of her family. But she equally valued that of others; she held that *noblesse oblige*—she might commit many sins but never a meanness; and would sacrifice any interests to the honor and glorification of her name! Haughty she was undeniably, sometimes cruelly insolently so; but it was the *naïf* haughtiness of one who never has had her superiority questioned, and it was always to her equals, never to her inferiors. She passed for being fond of money, but it was to accumulate for her children—she had no other interests. Life is singularly simplified in these existences bounded by their own room absolutely despotic as head of the family and as completely independent as to fortune with the power of absolute disposal of it at will. With her inferiors, her dependants, above all, with her personal servants—the *valet de chambre*, a sort of Caleb Balderstone, who often filled the place of five or six of our servants, and her lady's maid, an old woman like herself—she spoke with a familiarity which made my young eyes open wide at its contrast with our English home ways. She said *vous* to her husband if she still had one, but would *tutoyer* her servants. The distance in her own mind was too immeasurable to fear any possible advantage being taken of this freedom. The devoted attachment of these servants through the perils of the Revolution, through exile and privation, justified the system. Ill-paid, ill-fed on the remains of their master's table, snatched behind a screen in the ante-room, harder worked than our servants could conceive possible, lodged anyhow, anywhere, they still preserved the old feudal feeling of clanship and reverential devotion to the family they and their forefathers had served time out of mind.

It must be said that to them the family were affectionately kind, nursed them in illness, took a part in all their concerns, danced at their weddings, were godparents to their children, and showed them that lively interest, that human sympathy, worth far more than the gold they perhaps had not to give, although the old age of these retainers was never left without provision. Many of the great families being poor, the number of their domestics was small, although the dependants and members might be numerous; but the one whose convenience was never neglected, who was honored with personal intercourse and long conversations with his noble mistress, was the cook—always a man, for the *cuisinière* only belonged to the *bourgeoisie*.

My Grande Dame was invariably fond of her dinner, rather boasted of being *gourmande*. The Princesse de Poix used to hold as an axiom, *que le signe distinctif d'une femme biennée, c'est de se*

connaître en cuisine. French ladies mostly satisfy this requirement. They drink very little wine, generally *de l'eau rougie*, no tea or coffee after dinner, but they are not afraid of a tiny glass of the delicious liqueurs that are served round in such numbers at a French house.

Whatever the variety of character between them, there is one point in which all agree, love of conversation. The Grande Dame's real enjoyment in life was her *salon*. By this term is meant a reception held every evening, where the guests never expect food, or invitation after their first introduction. The *salons* I speak of were, I imagine, rather restricted to their own circle. I was too young at the time to go into society, so it is only from what I heard from my young friends, and from those I have since seen, that I can trace the difference which seems to have existed between the past and the present society. The halo of veneration which surrounded the aged grandmother, the heroine, the victim of catastrophes and misfortunes, of which perhaps history offers no other example, made *her* and her tastes and amusement the one object of the family reception; but they were not so amusing to others, with the exception of the Hôtel Beauvau, and one or two isolated cases. Still they were very agreeable ways of passing the evening, judging from the few which survived the reverses of 1830. The old lady sat enthroned in her comfortable arm-chair, the only one in the room—people did not loll as they do now. A *fauteuil*, that is one of those little stiff-backed articles with straight short arms which we see ranged round the old state rooms in French palaces, was placed near her, to which came the first guest, yielding the place in turns to each arrival. The other elderly ladies had their work at a table apart, where the visitors came to pay their *devoirs;* and—again apart—the young women and girls of the family, perhaps at a tea-table, a novelty then beginning to come in, although not much understood, for a girl friend said to me one day, "Comment va ta maman?" "Mais bien; pourquoi?" "Ah! c'est qu'elle prenait du thé hier." They still considered it as a *tisane* and medicinal. Politics were not talked at these houses, for the simple reason that the Grande Dame had none but loyalty. To her there was but one party—Monarchy; but one danger—Democracy. *La Charte* was something Louis XVIII. had kindly given to his people, but was never to interfere with his good pleasure of sending away one set of ministers for another, or passing any laws or enactments. Her code was neither Liberal nor Conservative, but *les Gentilhommes et la Canaille.* Strange as it may seem to us, such was her world of ideas from 1804 to 1830. There were in Paris at that time, as later, many *salons*, all differing in their society, literary, political, artistic, diplomatic, scientific, even theatrical; some receiving the young and brilliant world, some devoted to the graver questions of the day, some combining on one day in the week all parties, all specialties—except *les ennuyeux.* It would be far beyond my scope to enter into details of them. There is a charming volume called *Les Salons de Paris*, written, I believe, by M. E. Girardin, which may enlighten English people as to a form of society which does not exist and never can flourish in England.

During the last ten years of the Restoration these *salons* constituted the chief *société* of the *noblesse.* Louis XVIII., infirm and selfish, did little towards restoring the brilliancy of former days. Few courtiers survived the emigration. My Grande Dame's husband, if still alive, was a *chambellan*, but probably too old to attend Court, certainly too old to give life to it. They led a very dull existence. Too poor to give *fêtes* themselves, and avoiding the new nobility, they only went to the Court or Embassies, and occasionally to the Rothschild's and Delmar's, as neutral houses.

The gloom of Charles X.'s Court, after the assassination of the Duc de Berri, closed the door to all but the friends and adherents of the old order of things. The young generation began to horrify their parents by their indifference to such dull amusements and wearisome favors. The young widowed Duchesse de Berri, after a few years of seclusion, attempted to give again some animation to the Tuileries, but she failed, and who can wonder that, unheeding the royal frowns, she collected around her the rebellious youth of the noble Faubourg, and with them sought, in the brilliant

circle of the Palais Royal, the pleasures denied them in the stern and solemn Tuileries? With her young cousins—the Duc de Chartres, growing into manhood with the promise he so well kept of being the handsomest and most charming man of his day; with the Duc d'Aumale, and the rest of the gay young *troupe*, they rode, they drove ponies, they read books *à l'index*, they went to masked balls; it was said that, worst of all, they learnt English, and that, ignoring Waterloo, some of them actually visited London in the season, bringing back English fashions in horses and carriages, and even the taste for clubs, which before then were mere political *réunions*. The parents wisely felt that the next generation must progress with their times; they had too much sense to attempt to stem the torrent. The grandmother in her *salon*, though shorn of the pomp of her former stately existence, impoverished, but surrounded by her children's love and care, attended as dutifully as ever by the young reformers themselves, glided away her last days, scarcely realising the changes around her. She was growing very old, she had no longer vigor to use her restraining influence, had she retained it. To her darkening sight the cloud which was lowering over the Monarchy bore no threat. Few of them lived to see the Bourbons a third time dethroned, driven to exile or death. Before the Revolution of 1830 most of them died away, and with the accession of the *Régime Bourgeois* ended the *Grande Dame de l'Ancien Régime.—Macmillan's Magazine.*

THE LAST REDOUBT.

["With Mehemet Ali."—*Vide* the *Times*, September 29.]

BY ALFRED AUSTIN.

KACELYEVO'S slope still felt
The cannon's bolts and the rifles' pelt;
For a last redoubt up the hill remained,
By the Russ yet held, by the Turk not gained.

Mehemet Ali stroked his beard;
His lips were clinched and his look was weird;
Round him were ranks of his ragged folk,
Their faces blackened with blood and smoke.

"Clear me the Muscovite out!" he cried.
Then the name of "Allah!" echoed wide,
And the fezzes were waved and the bayonets lowered,
And on to the last redoubt they poured.

One fell, and a second quickly stopped
The gap that he left when he reeled and dropped;
The second,—a third straight filled his place;
The third,—and a fourth kept up the race.

Many a fez in the mud was crushed,
Many a throat that cheered was hushed,
Many a heart that sought the crest
Found Allah's arms and a houri's breast.

Over their corpses the living sprang,
And the ridge with their musket-rattle rang,
Till the faces that lined the last redoubt
Could see their faces and hear their shout.

In the redoubt a fair form towered,
That cheered up the brave and chid the coward;
Brandishing blade with a gallant air,
His head erect and his bosom bare.

"Fly! they are on us!" his men implored;
But he waved them on with his waving sword.
"It cannot be held; 'tis no shame to go!"
But he stood with his face set hard to the foe.

Then clung they about him, and tugged, and knelt.
He drew a pistol from out his belt,
And fired it blank at the first that set
Foot on the edge of the parapet.

Over, that first one toppled; but on
Clambered the rest till their bayonets shone,
As hurriedly fled his men dismayed,
Not a bayonet's length from the length of his blade.

"Yield!" But aloft his steel he flashed,
And down on their steel it ringing clashed;
Then back he reeled with a bladeless hilt,
His honor full, but his life-blood spilt.

They lifted him up from the dabbled ground;
His limbs were shapely, and soft, and round.
No down on his lip, on his cheek no shade:—
"Bismillah!" they cried, "'tis an Infidel maid!"

Mehemet Ali came and saw
The riddled breast and the tender jaw.
"Make her a bier of your arms," he said,
"And daintily bury this dainty dead!

"Make her a grave where she stood and fell,
'Gainst the jackal's scratch and the vulture's smell.
Did the Muscovite men like their maidens fight,
In their lines we had scarcely supped to-night."

So a deeper trench 'mong the trenches there
Was dug, for the form as brave as fair;
And none, till the Judgment trump and shout,
Shall drive her out of the Last Redoubt.

Cornhill Magazine.

SCIENCE AND MAN.*

BY PROFESSOR TYNDALL.

A MAGNET attracts iron, but when we analyse the effect we learn that the metal is not only attracted but repelled, the final approach to the magnet being due to the difference of two unequal and opposing forces. Social progress is for the most part typified by this duplex or polar action. As a general rule, every advance is balanced by a partial retreat, every amelioration is associated more or less with deterioration. No great me-

* Presidential address, delivered before the Birmingham and Midland Institute, October 1st, 1877; with additions.

chanical improvement, for example, is introduced for the benefit of society at large that does not bear hardly upon individuals. Science, like other things, is subject to the operation of this polar law, what is good for it under one aspect being bad for it under another.

Science demands above all things personal concentration. Its home is the study of the mathematician, the quiet laboratory of the experimenter, and the cabinet of the meditative observer of nature. Different atmospheres are required by the man of science, as such and the man of action. The atmosphere, for example,which vivifies and stimulates your excellent representatives, Mr. Chamberlain, would be death to me. There are organisms which flourish in oxygen—he is one of them. There are also organisms which demand for their duller lives a less vitalising air—I am one of these. Thus the facilities of social and international intercourse, the railway, the telegraph, and the post-office, which are such undoubted boons to the man of action, react to some extent injuriously on the man of science. Their tendency is to break up that concentrativeness which, as I have said, is an absolute necessity to the scientific investigator.

The men who have most profoundly influenced the world from the scientific side have habitually sought isolation. Faraday, at a certain period of his career, formally renounced dining out. Darwin lives apart from the bustle of the world in his quiet home in Kent. Mayer and Joule dealt in unobtrusive retirement with the weightiest scientific questions. None of these men, to my knowledge, ever became Presidents of the Midland Institute or of the British Association. They could not fail to know that both positions are posts of honor, but they would also know that such positions cannot be filled without grave disturbance of that sequestered peace which to them is a first condition of intellectual life.

There is, however, one motive power in the world which no man, be he a scientific student or otherwise, can afford to treat with indifference, and that is, the cultivation of right relations with his fellow-men—the performance of his duty, not as an isolated individual but as a member of society. Such duty often requires the sacrifice of private ease to the public wishes if not to the public good. From this point of view the invitation conveyed to me more than once by your excellent senior Vice-President was not to be declined. It was an invitation written with the earnestness said to be characteristic of a Radical and certainly with the courtesy characteristic of a gentleman. It quickened within me the desire to meet in a cordial and brotherly spirit the wish of an institution of which not only Birmingham but England may well be proud, and of whose friendliness to myself I had agreeable evidence in the letters of Mr. Thackray Bunce.

To look at his picture as a whole a painter requires distance; and to judge of the total scientific achievement of any age, the standpoint of a succeeding age is desirable. We may, however, transport ourselves in idea into the future, and thus obtain a grasp more or less complete of the science of our time. We sometimes hear it decried, and contrasted to its disadvantage with the science of other times. I do not think that this will be the verdict of posterity. I think, on the contrary, that posterity will acknowledge that in the history of science no higher samples of intellectual conquest are recorded than those which this age has made its own. One of the most salient of these I propose, with your permission, to make the subject of our consideration during the coming hour.

It is now generally admitted that the man of to-day is the child and product of incalculable antecedent time. His physical and intellectual textures have been woven for him during his passage through phases of history and forms of existence which lead the mind back to an abysmal past. One of the qualities which he has derived from that past is the yearning to let in the light of principles on the otherwise bewildering flux of phenomena. He has been described by the German Lichtenberg as "das rastlose Ursachenthier"—the restless cause-seeking animal—in whom facts excite a kind of hunger to know the sources from which they spring. Never, I venture to say, in the history of the world has this longing been more liberally responded to, both among men of science and the general public, than during the last thir-

ty or forty years. I say "the general public," because it is a feature of our time that the man of science no longer limits his labors to the society of his colleagues and his peers, but shares, as far as it is possible to share, with the world at large the fruits of inquiry.

The celebrated Robert Boyle regarded the universe as a machine; Mr. Carlyle prefers regarding it as a tree. He loves the image of the umbrageous Igdrasil better than that of the Strasburg clock. A machine may be defined as an organism with life and direction outside; a tree may be defined as an organism with life and direction within. In the light of these definitions, I close with the conception of Carlyle. The order and energy of the universe I hold to be inherent, and not imposed from without, the expression of fixed law and not of arbitrary will, exercised by what Carlyle would call an Almighty Clockmaker. But the two conceptions are not so much opposed to each other after all. In one fundamental particular they at all events agree. They equally imply the interdependence and harmonious interaction of parts, and the subordination of the individual powers of the universal organism to the working of the whole.

Never were the harmony and interdependence just referred to so clearly recognised as now. Our insight regarding them is not that vague and general insight to which our fathers had attained, and which, in early times, was more frequently affirmed by the synthetic poet than by the scientific man. The interdependence of our day has become quantitative—expressible by numbers—leading, it must be added, directly into that inexorable reign of law which so many gentle people regard with dread. In the domain now under review men of science had first to work their way from darkness into twilight, and from twilight into day. There is no solution of continuity in science. It is not given to any man, however endowed, to rise spontaneously into intellectual splendor without the parentage of antecedent thought. Great discoveries grow. Here, as in other cases, we have first the seed, then the ear, then the full corn in the ear, the last member of the series implying the first. Thus, as regards the discovery of gravitation with which the name of Newton is identified, notions more or less clear concerning it had entered many minds before Newton's transcendent mathematical genius raised it to the level of a demonstration. The whole of his deductions, moreover, rested upon the inductions of Kepler. Newton shot beyond his predecessors, but his thoughts were rooted in their thoughts, and a just distribution of merit would assign to them a fair portion of the honor of discovery.

Scientific theories sometimes float like rumors in the air before they receive definite expression. The doom of a doctrine is often practically sealed, and the truth of one is often practically accepted, long prior to the theoretic demonstration of either the error or the truth. Perpetual motion, for example, was discarded before it was proved to be in opposition to natural law; and as regards the connection and interaction of natural forces, pre-natal intimations of modern discoveries and results are strewn through scientific literature.

Confining ourselves to recent times, Dr. Ingleby has pointed out to me some singularly sagacious remarks bearing upon this question, which were published by an anonymous writer in 1820. Roget's penetration was conspicuous in 1829. Mohr had grasped in 1837 some deeplying truth. The writings of Faraday furnish frequent illustrations of his profound belief in the unity of nature. "I have long," he writes in 1845, "held an opinion almost amounting to conviction, in common, I believe, with other lovers of natural knowledge, that the various forms under which the forces of matter are made manifest have one common origin, or, in other words, are so directly related and mutually dependent, that they are convertible, as it were, one into another, and possess equivalence of power in their action." His own researches on magneto-electricity, on electro-chemistry, and on the "magnetisation of light" led him directly to this belief. At an early date Mr. Justice Grove made his mark upon this question. Colding, though starting from a metaphysical basis, grasped eventually the relation between heat and mechanical work, and sought to determine it experimentally. And here let me say, that to him who has only the truth at heart, and who in

his dealings with scientific history keeps his soul unwarped by envy, hatred, or malice, personal or national, every fresh accession to historic knowledge must be welcome. For every new-comer of proved merit, more especially if that merit should have been previously overlooked, he makes ready room in his recognition or his reverence. But no retrospect of scientific literature has as yet brought to light a claim which can sensibly affect the positions accorded to two great *Path-hewers*, as the Germans call them, whose names in relation to this subject are linked in indissoluble association. These names are Julius Robert Mayer and James Prescott Joule.

In his essay on "Circles" Mr. Emerson, if I remember rightly, pictured intellectual progress as rythmic. At a given moment knowledge is surrounded by a barrier which marks its limit. It gradually gathers clearness and strength until by and by some thinker of exceptional power bursts the barrier and wins a wider circle, within which thought once more entrenches itself. But the internal force again accumulates, the new barrier is in its turn broken, and the mind finds itself surrounded by a still wider horizon. Thus, according to Emerson, knowledge spreads by intermittent victories instead of progressing at a uniform rate.

When Dr. Joule first proved that a weight of one pound, falling through a height of seven hundred and seventy-two feet, generated an amount of heat competent to warm a pound of water one degree Fahrenheit, and that in lifting the weight so much heat exactly disappeared, he broke an Emersonian "circle," releasing by the act an amount of scientific energy which rapidly overran a vast domain. Helmholtz, Clausius, Thomson, Rankine, Regnault, Woods, Favre, and other illustrious names, are associated with the conquests since achieved and embodied in the great doctrine known as the "Conservation of Energy." This doctrine recognises in the material universe a constant sum of power made up of items among which the most Protean fluctuations are incessantly going on. It is as if the body of Nature were alive, the thrill and interchange of its energies resembling those of an organism. The parts of the "stupendous whole" shift and change, augment and diminish, appear and disappear, while the total of which they are the parts remains quantitatively immutable. Immutable, because when change occurs it is always polar—plus accompanies minus, gain accompanies loss, no item varying in the slightest degree without an absolutely equal change of some other item in the opposite direction.

The sun warms the tropical ocean, converting a portion of its liquid into vapor, which rises in the air and is recondensed on mountain heights, returning in rivers to the ocean from which it came. Up to the point where condensation begins, an amount of heat exactly equivalent to the molecular work of vaporisation and the mechanical work of lifting the vapor to the mountain-tops has disappeared from the universe. What is the gain corresponding to this loss? It will seem when mentioned to be expressed in a foreign currency. The loss is a loss of heat; the gain is a gain of distance, both as regards masses and molecules. Water which was formerly at the sea-level has been lifted to a position from which it can fall; molecules which had been locked together as a liquid are now separate as vapor which can recondense. After condensation gravity comes into effectual play, pulling the showers down upon the hills, and the rivers thus created through their gorges to the sea. Every raindrop which smites the mountain produces its definite amount of heat; every river in its course develops heat by the clash of its cataracts and the friction of its bed. In the act of condensation, moreover, the molecular work of vaporisation is accurately reversed. Compare, then, the primitive loss of solar warmth with the heat generated by the condensation of the vapor, and by the subsequent fall of the water from cloud to sea. They are mathematically equal to each other. No particle of vapor was formed and lifted without being paid for in the currency of solar heat; no particle returns as water to the sea without the exact quantitative restitution of that heat. There is nothing gratuitous in physical nature, no expenditure without equivalent gain, no gain without equivalent expenditure. With inexorable constancy the one accompanies the other, leaving no nook

or crevice between them for spontaneity to mingle with the pure and necessary play of natural force. Has this uniformity of nature ever been broken? The reply is: "Not to the knowledge of science."

What has been here stated regarding heat and gravity applies to the whole of inorganic nature. Let us take an illustration from chemistry. The metal zinc may be burnt in oxygen, a perfectly definite amount of heat being produced by the combustion of a given weight of the metal. But zinc may also be burnt in a liquid which contains a supply of oxygen—in water, for example. It does not in this case produce flame or fire, but it does produce heat which is capable of accurate measurement. But the heat of zinc burnt in water falls short of that produced in pure oxygen, the reason being that to obtain its oxygen from the water the zinc must first dislodge the hydrogen. It is in the performance of this molecular work that the missing heat is absorbed. Mix the liberated hydrogen with the oxygen and cause them to recombine; the heat developed is mathematically equal to the missing heat. Thus in pulling the oxygen and hydrogen asunder an amount of heat is consumed which is accurately restored by their reunion.

This leads up to a few remarks upon the Voltaic battery. It is not my design to dwell upon the technic features of this wonderful instrument, but simply, by means of it, to show what varying shapes a given amount of energy can assume while maintaining unvarying quantitative stability. When that form of power which we call an electric current passes through Grove's battery, zinc is consumed in acidulated water; and in the battery we are able so to arrange matters that when no current passes no zinc shall be consumed. Now the current, whatever it may be, possesses the power of generating heat outside the battery. We can fuse with it iridium, the most refractory of metals, or we can produce with it the dazzling electric light, and that at any terrestrial distance from the battery itself.

We will now, however, content ourselves with causing the current to raise a given length of platinum wire, first to a blood-heat, then to redness, and finally to a white heat. The heat under these circumstances generated in the battery by the combustion of a fixed quantity of zinc is no longer constant, but it varies inversely as the heat generated outside. If the outside heat be *nil*, the inside heat is a maximum; if the external wire be raised to a blood-heat, the internal heat falls slightly short of the maximum. If the wire be rendered red-hot, the quantity of missing heat within the battery is greater, and if the external wire be rendered white-hot, the defect is greater still. Add together the internal and external heat produced by the combustion of a given weight of zinc, and you have an absolutely constant total. The heat generated without is so much lost within, the heat generated within is so much lost without, the polar changes already adverted to coming here conspicuously into play. Thus in a variety of ways we can distribute the items of a never-varying sum, but even the subtle agency of the electric current places no creative power in our hands.

Instead of generating external heat, we may cause the current to effect chemical decomposition at a distance from the battery. Let it, for example, decompose water into oxygen and hydrogen. The heat generated in the battery under these circumstances by the combustion of a given weight of zinc falls short of what is produced when there is no decomposition. How far short? The question admits of a perfectly exact answer. When the oxygen and hydrogen recombine, the heat absorbed in the decomposition is accurately restored, and it is exactly equal in amount to that missing in the battery. We may, if we like, bottle up the gases, carry in this form the heat of the battery to the polar regions, and liberate it there. The battery, in fact, is a hearth on which fuel is consumed, but the heat of the combustion, instead of being confined in the usual manner to the hearth itself, may be first liberated at the other side of the world.

And here we are able to solve an enigma which long perplexed scientific men, and which could not be solved until the bearing of the mechanical theory of heat upon the phenomena of the Voltaic battery was understood. The puzzle was, that a single cell could not de-

compose water. The reason is now plain enough. The solution of an equivalent of zinc in a single cell developes not much more than half the amount of heat required to decompose an equivalent of water, and the single cell cannot cede an amount of force which it does not possess. But by forming a battery of two cells instead of one, we develop an amount of heat slightly in excess of that needed for the decomposition of the water. The two-celled battery is therefore rich enough to pay for that decomposition, and to maintain the excess referred to within its own cells.

Similar reflections apply to the thermo-electric pile, an instrument usually composed of small bars of bismuth and antimony soldered alternately together. The electric current is here evoked by warming the soldered junctions of one face of the pile. Like the Voltaic current, the thermo-electric current can heat wires, produce decomposition, magnetise iron, and deflect a magnetic needle at any distance from its origin. You will be disposed, and rightly disposed, to refer those distant manifestations of power to the heat communicated to the face of the pile, but the case is worthy of closer examination. In 1826 Thomas Seebeck discovered thermo-electricity, and six years subsequently Peltier made an observation which comes with singular felicity to our aid in determining the material used up in the formation of the thermo-electric current. He found that when a weak extraneous current was sent from antimony to bismuth the junction of the two metals was always heated, but that when the direction was from bismuth to antimony the junction was chilled. Now the current in the thermo-pile itself is always from bismuth to antimony, across the heated junction—a direction in which it cannot possibly establish itself without consuming the heat imparted to the junction. This heat is the nutriment of the current. Thus the heat generated by the thermo-current in a distant wire is simply that originally imparted to the pile, which has been first transmuted into electricity, and then retransmuted into its first form at a distance from its origin. As water in a state of vapor passes from a boiler to a distant condenser, and there assumes its primitive form without gain or loss, so the heat communicated to the thermo-pile distils into the subtler electric current, which is, as it were, recondensed into heat in the distant platinum wire.

In my youth I thought an electro-magnetic engine which was shown to me a veritable perpetual motion—a machine, that is to say, which performed work without the expenditure of power. Let us consider the action of such a machine. Suppose it to be employed to pump water from a lower to a higher level. On examining the battery which works the engine we find that the zinc consumed does not yield its full amount of heat. The quantity of heat thus missing within is the exact thermal equivalent of the mechanical work performed without. Let the water fall again to the lower level; it is warmed by the fall. Add the heat thus produced to that generated by the friction, mechanical and magnetical, of the engine; we thus obtain the precise amount of heat missing in the battery. All the effects obtained from the machine are thus strictly paid for; this "payment for results" being, I would repeat, the inexorable method of nature.

No engine, however subtly devised, can evade this law of equivalence, or perform on its own account the smallest modicum of work. The machine distributes, but it cannot create. Is the animal body, then, to be classed among machines? When I lift a weight, or throw a stone, or climb a mountain, or wrestle with my comrade, am I not conscious of actually creating and expending force? Let us look to the antecedents of this force. We derive the muscle and fat of our bodies from what we eat. Animal heat you know to be due to the slow combustion of this fuel. My arm is now inactive, and the ordinary slow combustion of my blood and tissue is going on. For every grain of fuel thus burnt a perfectly definite amount of heat has been produced. I now contract my biceps muscle without causing it to perform external work. The combustion is quickened, and the heat is increased; this additional heat being liberated in the muscle itself. I lay hold of a 56 lb. weight, and by the contraction of my biceps lift it through the vertical space of a foot. The blood and tissue consumed during this contraction have

not developed in the muscle their due amount of heat. A quantity of heat is at this moment missing in my muscle which would raise the temperature of an ounce of water somewhat more than one degree Fahrenheit. I liberate the weight: it falls to the earth, and by its collision generates the precise amount of heat missing in the muscle. My muscular heat is thus transferred from its local hearth to external space. The fuel is consumed in my body, but the heat of combustion is produced outside my body. The case is substantially the same as that of the Voltaic battery when it performs external work, or produces external heat. All this points to the conclusion that the force we employ in muscular exertion is the force of burning fuel and not of creative will. In the light of these facts the body is seen to be as incapable of generating energy without expenditure, as the solids and liquids of the Voltaic battery. The body, in other words, falls into the category of machines.

We can do with the body all that we have already done with the battery—heat platinum wires, decompose water, magnetise iron, and deflect a magnetic needle. The combustion of muscle may be made to produce all these effects, as the combustion of zinc may be caused to produce them. By turning the handle of a magneto-electric machine a coil of wire may be caused to rotate between the poles of a magnet. As long as the two ends of the coil are unconnected we have simply to overcome the ordinary inertia and friction of the machine in turning the handle. But the moment the two ends of the coil are united by a thin platinum wire a sudden addition of labor is thrown upon the turning arm. When the necessary labor is expended, its equivalent immediately appears. The platinum wire glows. You can readily maintain it at a white heat, or even fuse it. This is a very remarkable result. From the muscles of the arm, with a temperature of 100°, we extract the temperature of molten platinum, which is many thousand degrees. The miracle here is the reverse of that of the burning bush mentioned in Exodus. There the bush burned but was not consumed: here the body is consumed but does not burn. The similarity of the action with that of the Voltaic battery when it heats an external wire is too obvious to need pointing out. When the machine is used to decompose water, the heat of the muscle, like that of the battery, is consumed in molecular work, being fully restored when the gases recombine. As before, also, the transmuted heat of the muscles may be bottled up, carried to the polar regions, and there restored to its pristine form.

The matter of the human body is the same as that of the world around us; and here we find the forces of the human body identical with those of inorganic nature. Just as little as the Voltaic battery is the animal body a creator of force. It is an apparatus exquisite and effectual beyond all others in transforming and distributing the energy with which it is supplied, but it possesses no creative power. Compared with the notions previously entertained regarding the play of "vital force", this is a great result. The problem of vital dynamics has been described by a competent authority as "the grandest of all." I subscribe to this opinion, and honor correspondingly the man who first successfully grappled with the problem. He was no pope, in the sense of being infallible, but he was a man of genius whose work will be held in honor as long as science endures. I have already named him in connection with our illustrious countryman Dr. Joule. Other eminent men took up this subject subsequently and independently, but all that has been done hitherto enhances instead of diminishing the merits of Dr. Mayer.

Consider the vigor of his reasoning. "Beyond the power of generating internal heat, the animal organism can generate heat external to itself. A blacksmith by hammering can warm a nail, and a savage by friction can heat wood to its point of ignition. Unless, then, we abandon the physiological axiom that the animal body cannot create heat out of nothing, we are driven to the conclusion that *it is the total heat, within and without, that ought to be regarded as the real calorific effect of the oxidation within the body.*" Mayer, however, not only states the principle but illustrates numerically the transfer of muscular heat to external space. A bowler who imparts a velocity of 30 feet to an 8-lb. ball con-

sumes in the act $\frac{1}{16}$ of a grain of carbon. The heat of the muscle is here distributed over the track of the ball, being developed there by mechanical friction. A man weighing 150 lbs. consumes in lifting his own body to a height of 8 feet the heat of a grain of carbon. Jumping from this height the heat is restored. The consumption of 2 oz. 4 drs. 20 grs. of carbon would place the same man on the summit of a mountain 10,000 feet high. In descending the mountain an amount of heat equal to that produced by the combustion of the foregoing amount of carbon is restored. The muscles of a laborer whose weight is 150 lbs. weigh 64 lbs. When dried they are reduced to 15 lbs. Were the oxidation corresponding to a day-laborer's ordinary work exerted on the muscles alone, they would be wholly consumed in 80 days. Were the oxidation necessary to sustain the heart's action concentrated on the heart itself, it would be consumed in 8 days. And if we confine our attention to the two ventricles, their action would consume the associated muscular tissue in 3½ days. With a fulness and precision of which this is but a sample did Mayer, between 1842 and 1845, deal with the great question of vital dynamics.

In direct opposition, moreover, to the foremost scientific authorities of that day, with Liebig at their head, this solitary Heilbronn worker was led by his calculations to maintain that the muscles, in the main, played the part of machinery, converting the fat, which had been previously considered a mere heat-producer, into the motive power of the organism. Mayer's prevision has been justified by events, for the scientific world is now upon his side.

We place, then, food in our stomachs as so much combustible matter. It is first dissolved by purely chemical processes, and the nutritive fluid is poured into the blood. Here it comes into contact with atmospheric oxygen admitted by the lungs. It unites with the oxygen as wood or coal might unite with it in a furnace. The matter-products of the union, if I may use the term, are the same in both cases, viz., carbonic acid and water. The force-products are also the same—heat within the body, or heat and work outside the body. Thus far every action of the organism belongs to the domain either of physics or of chemistry. But you saw me contract the muscle of my arm. What enabled me to do so? Was it or was it not the direct action of my will? The answer is, the action of the will is mediate, not direct. Over and above the muscles the human organism is provided with long whitish filaments of medullary matter, which issue from the spinal column, being connected by it on the one side with the brain, and on the other side losing themselves in the muscles. Those filaments or cords are the nerves, which you know are divided into two kinds, sensor and motor, or, if you like the terms better, afferent and efferent nerves. The former carry impressions from the external world to the brain; the latter convey the behests of the brain to the muscles. Here, as elsewhere, we find ourselves aided by the sagacity of Mayer, who was the first clearly to formulate the part played by the nerves in the organism. Mayer saw that neither nerves nor brain, nor both together, possessed the energy necessary to animal motion; but he also saw that the nerve could lift a latch and open a door, by which floods of energy are let loose. "As an engineer," he says with admirable lucidity, "by the motion of his finger in opening a valve or loosening a detent can liberate an amount of mechanical energy almost infinite compared with its exciting cause; so the nerves, acting on the muscles, can unlock an amount of power out of all proportion to the work done by the nerves themselves." The nerves, according to Mayer, pull the trigger, but the gunpowder which they ignite is stored in the muscles. This is the view now universally entertained.

The quickness of thought has passed into a proverb, and the notion that any measurable time elapsed between the infliction of a wound and the feeling of the injury would have been rejected as preposterous thirty years ago. Nervous impressions, notwithstanding the results of Haller, were thought to be transmitted, if not instantaneously, at all events with the rapidity of electricity. Hence, when Helmholtz, in 1851, affirmed as the result of experiment, nervous transmission to be a comparatively sluggish process, very few believed him. His ex-

periments may now be made in the lecture-room. Sound in air moves at the rate of 1100 feet a second; sound in water moves at the rate of 5000 feet a second; light in ether moves at the rate of 186,000 miles a second, and electricity in free wires moves probably at the same rate. But the nerves transmit their messages at the rate of only 70 feet a second, a progress which in these quick times might well be regarded as intolerably slow.

Your townsman, Mr. Gore, has produced by electrolysis a kind of antimony which exhibits an action strikingly analogous to that of nervous propagation. A rod of this antimony is in such a molecular condition that when you scratch or heat one end of the rod, the disturbance propagates itself before your eyes to the other end, the onward march of the disturbance being announced by the development of heat and fumes along the line of propagation. In some such way the molecules of the nerves are successively overthrown; and if Mr. Gore could only devise some means of winding up his exhausted antimony, as the nutritive blood winds up exhausted nerves, the comparison would be complete. The subject may be summed up, as Du Bois-Reymond has summed it up, by reference to the case of a whale struck by a harpoon in the tail. If the animal were 70 feet long, a second would elapse before the disturbance could reach the brain. But the impression after its arrival has to diffuse itself and throw the brain into the molecular condition necessary to consciousness. Then, and not till then, the command to the tail to defend itself is shot through the motor nerves. Another second must elapse before the command can reach the tail, so that more than two seconds transpire between the infliction of the wound and the muscular response of the part wounded. The interval required for the kindling of consciousness would probably more than suffice for the destruction of the brain by lightning, or even by a rifle-bullet. Before the organ can arrange itself it may, therefore, be destroyed, and in such a case we may safely conclude that death is painless.

The experiences of common life supply us with copious instances of the liberation of vast stores of muscular power by an infinitesimal "priming" of the muscles by the nerves. We all know the effect produced on a "nervous" organisation by a slight sound which causes affright. An aerial wave, the energy of which would not reach a minute fraction of that necessary to raise the thousandth of a grain through the thousandth of an inch, can throw the whole human frame into a powerful mechanical spasm, followed by violent respiration and palpitation. The eye, of course, may be appealed to as well as the ear. Of this the lamented Lange gives the following vivid illustration:

A merchant sits complacently in his easy chair, not knowing whether smoking, sleeping, newspaper reading, or the digestion of food occupies the largest portion of his personality. A servant enters the room with a telegram bearing the words, "Antwerp, &c. . . . . Jonas and Co. have failed." "Tell James to harness the horses!" The servant flies. Up starts the merchant, wide awake; makes a dozen paces through the room, descends to the counting-house, dictates letters and forwards dispatches. He jumps into his carriage, the horses snort, and their driver is immediately at the Bank, on the Bourse, and among his commercial friends. Before an hour has elapsed he is again at home, where he throws himself once more into his easy chair with a deep-drawn sigh, "Thank God I am protected against the worst, and now for further reflection."

This complex mass of action, emotional, intellectual, and mechanical, is evoked by the impact upon the retina of the infinitesimal waves of light coming from a few pencil-marks on a bit of paper. We have, as Lange says, terror, hope, sensation, calculation, possible ruin, and victory compressed into a moment. What caused the merchant to spring out of his chair? The contraction of his muscles. What made his muscles contract? An impulse of the nerves, which lifted the proper latch, and liberated the muscular power. Whence this impulse? From the centre of the nervous system. But how did it originate there? This is the critical question, to which some will reply that it had its origin in the human soul.

The aim and effort of science is to ex-

plain the unknown in terms of the known. Explanation, therefore, is conditioned by knowledge. You have probably heard the story of the German peasant who, in early railway days, was taken to see the performance of a locomotive. He had never known carriages to be moved except by animal power. Every explanation outside of this conception lay beyond his experience, and could not be invoked. After long reflection, therefore, and seeing no possible escape from the conclusion, he exclaimed confidently to his companion, "Es müssen doch Pferde darin sein"—there must be horses inside. Amusing as this locomotive theory may seem, it illustrates a deep-lying truth.

With reference to our present question, some may be disposed to press upon me such considerations as these:—Your motor nerves are so many speaking-tubes, through which messages are sent from the man to the world; and your sensor nerves are so many conduits through which the whispers of the world are sent back to the man. But you have not told us where *is* the man. Who or what is it that sends and receives those messages through the bodily organism? Do not the phenomena point to the existence of a self within the self, which acts through the body as through a skilfully constructed instrument? You picture the muscles as harkening to the commands sent through the motor nerves, and you picture the sensor nerves as the vehicles of incoming intelligence; are you not bound to supplement this mechanism by the assumption of an entity which uses it? In other words, are you not forced by your own exposition into the hypothesis of a free human soul?

Is this reasoning congruous with the knowledge of our time? If so, it cannot be called unscientific. On the same ground the anthropomorphic notion of a creative architect, endowed with manlike powers of indefinite magnitude, is to be regarded with consideration. It marks a phase of theoretic activity, which the human race could not escape, and our present objection to such a notion rests on its incongruity with our knowledge. "When God," says the great Jesuit teacher, Perrone, "orders a given planet to stand still, he does not detract from any law passed by Himself, but orders that planet to move round and round the sun for such and such a time, then to stand still, and then to move again, as his pleasure may be." You notice that a modicum of science has entered even the mind of Perrone. At an earlier period he would not have said, "When God orders a planet to move round the sun," but "When God orders the sun to move round a planet." And why, unless the commands of the Almighty are hampered by considerations of mass, should He not give this latter order? Why, moreover, has He suspended his orders, and abandoned sun and planets to the law of gravitation during those particular ages when the human intellect was most specially prepared to appreciate the wonder? The case, to say the least, is suspicious. In Joshua's time such an hypothesis was allowable, and the error of Perrone is simply a sin against the law of relativity. He, and such as he, transport into the nineteenth century the puerilities of a bygone age. No wonder that our catholic youth from time to time rebel against such teaching.

But to return to the hypothesis of a human soul, offered as an explanation or simplification of a series of obscure phenomena. Adequate reflection shows that instead of introducing light into our minds it increases our darkness. You do not in this case explain the unknown in terms of the known, which, as stated above, is the method of science, but you explain the unknown in terms of the more unknown. Try to mentally visualise this soul as an entity distinct from the body, and the difficulty immediately appears. From the side of science all that we are warranted in stating is that the terror, hope, sensation, and calculation of Lange's merchant, are psychical phenomena produced by, or associated with, the molecular processes set up by waves of light in a previously prepared brain.

When facts present themselves let us dare to face them, but let us equally dare to confess ignorance where it prevails. What is the casual connection, if any, between the objective and subjective—between molecular motions and states of consciousness? My answer is: I do not see the connection, nor have I as yet met anybody who does. It is no

explanation to say that the objective and subjective effects are two sides of one and the same phenomenon. Why should the phenomenon have two sides? This is the very core of the difficulty. There are plenty of molecular motions which do not exhibit this two-sideness. Does water think or feel when it runs into frost-ferns upon a window-pane? If not, why should the molecular motion of the brain be yoked to this mysterious companion — consciousness? We can present to our minds a coherent picture of the physical processes—the stirring of the brain, the thrilling of the nerves, the discharging of the muscles, and all the subsequent mechanical motions of the organism. But we can present no picture of the process whereby consciousness emerges, either as a necessary link or as an accidental by-product of this series of actions. Yet it certainly does emerge—the prick of a pin suffices to prove that molecular motion can produce consciousness. The reverse process of the production of motion by consciousness is equally unpresentable to the mind. We are here, in fact, upon the boundary line of the intellect, where the ordinary canons of science fail to extricate us from our difficulties. If we are true to these canons, we must deny to subjective phenomena all influence on physical processes. Observation proves that they interact, but in passing from the one to the other we meet a blank which mechanical deduction is unable to fill. Frankly stated, we have here to deal with facts almost as difficult to be seized mentally as the idea of a soul. And if you are content to make your "soul" a poetic rendering of a phenomenon which refuses the yoke of ordinary physical laws, I, for one, would not object to this exercise of ideality. Amid all our speculative uncertainty, however, there is one practical point as clear as the day; namely, that the brightness and the usefulness of life, as well as its darkness and disaster, depend to a great extent upon our own use or abuse of this miraculous organ.

[In an article betraying signs of haste and its consequent confusion, a well-known and accomplished essayist pulls me sharply up in the *Spectator* * for the phraseology here employed. In a single breath he brands my "poetic rendering" as a "falsehood" and a "fib." I should be loth to apply to any utterance of my respected critic terms so uncivil as these. They are, in my opinion, unmerited, for poetry or ideality and untruth are assuredly very different things. The one may vivify while the other kills. When St. John extends the notion of a soul to "souls washed in the blood of Christ" does he "fib"? Indeed, Christ himself, according to my critic's canon, ought not to have escaped censure. Nor did he escape it. "How can this man give us his flesh to eat?" expressed the sceptical flouting of unpoetic natures. Such are still amongst us. Cardinal Manning would doubtless tell my critic that he, even he, "fibs" away the plain words of his Saviour when he reduces "the Body of the Lord" in the sacrament to a mere figure of speech.

Though misuse may render it grotesque or insincere, the idealisation of ancient conceptions, when done consciously and above board, has, in my opinion, an important future. We are not radically different from our historic ancestors, and any feeling which affected them profoundly, requires only appropriate clothing to affect us. The world will not lightly relinquish its heritage of poetic feeling, and metaphysic will be welcomed when it abandons its pretensions to scientific discovery and consents to be ranked as a kind of poetry. "A good symbol," says Emerson, "is a missionary to persuade thousands. The Vedas, the Edda, the Koran, are each remembered by its happiest figure. There is no more welcome gift to men than a new symbol. They assimilate themselves to it, deal with it in all ways, and it will last a hundred years. Then comes a new genius and brings another." Our ideas of God and the soul are obviously subject to this symbolic mutation. They are not now what they were a century ago. They will not be a century hence what they are now. Such ideas constitute a kind of central energy in the human mind, capable, like the energy of the physical universe, of assuming various shapes and undergoing various transformations. They baffle and elude the theological mechanic who would carve them to dogmatic forms. They

* Reproduced in ECLECTIC for December.

offer themselves freely to the poet who understands his vocation, and whose function is, or ought to be, to find "local habitation" for thoughts woven into our subjective life, but which refuse to be mechanically defined.]

We now stand face to face with the final problem. It is this: Are the brain, and the moral and intellectual processes known to be associated with the brain—and as far as our experience goes, indissolubly associated—subject to the laws which we find paramount in physical nature? Is the will of man, in other words, free, or are it and nature equally "bound fast in fate"? From this latter conclusion, after he had established it to the entire satisfaction of his understanding, the great German thinker Fichte recoiled. You will find the record of this struggle between head and heart in his book, entitled "Die Bestimmung des Menschen"—The Vocation of Man.* Fichte was determined at all hazards to maintain his freedom, but the price he paid for it indicates the difficulty of the task. To escape from the iron necessity seen everywhere reigning in physical nature, he turned defiantly round upon nature and law, and affirmed both of them to be the products of his own mind. He was not going to be the slave of a thing which he had himself created. There is a good deal to be said in favor of this view, but few of us probably would be able to bring into play the solvent transcendentalism whereby Fichte melted his chains.

Why do some of us regard this notion of necessity with terror, while others do not fear it at all? Has not Carlyle somewhere said that a belief in destiny is the bias of all earnest minds? "It is not Nature," says Fichte, "it is Freedom itself, by which the greatest and most terrible disorders incident to our race are produced. Man is the cruellest enemy of man." But the question of moral responsibility here emerges, and it is the possible loosening of this responsibility that so many of us dread. The notion of necessity certainly failed to frighten Bishop Butler. He thought it untrue, but he did not fear its practical consequences. He showed, on the contrary, in the "Analogy," that as far as human conduct is concerned, the two theories of free-will and necessity come to the same in the end.

What is meant by free-will? Does it imply the power of producing events without antecedents?—of starting, as it were, upon a creative tour of occurrences without any impulse from within or from without? Let us consider the point. If there be absolutely or relatively no reason why a tree should fall, it will not fall; and if there be absolutely or relatively no reason why a man should act, he will not act. It is true that the united voice of this assembly could not persuade me that I have not, at this moment, the power to lift my arm if I wished to do so. Within this range the conscious freedom of my will cannot be questioned. But what about the origin of the "wish"? Are we, or are we not, complete masters of the circumstances which create our wishes, motives, and tendencies to action? Adequate reflection will, I think, prove that we are not. What, for example, have I had to do with the generation and development of that which some will consider my total being, and others a most potent factor of my total being—the living, speaking organism which now addresses you? As stated at the beginning of this discourse, my physical and intellectual textures were woven *for* me, not *by* me. Processes in the conduct or regulation of which I had no share have made me what I am. Here, surely, if anywhere, we are as clay in the hands of the potter. It is the greatest of delusions to suppose that we come into this world as sheets of white paper on which the age can write anything it likes, making us good or bad, noble or mean, as the age pleases. The age can stunt, promote, or pervert pre-existent capacities, but it cannot create them. The worthy Robert Owen, who saw in external circumstances the great moulders of human character, was obliged to supplement his doctrine by making the man himself one of the circumstances. It is as fatal as it is cowardly to blink facts because they are not to our taste. How many disorders, ghostly and bodily, are transmitted to us by inheritance? In our courts of law, whenever it is a question whether a crime has been committed under the influence of insanity, the best guidance the judge and jury can have is derived from the parental antecedents of the accused. If among these insanity be

* Translated by Dr. William Smith; Trübner, 1873.

exhibited in any marked degree, the presumption in the prisoner's favor is enormously enhanced, because the experience of life has taught both judge and jury that insanity is frequently transmitted from parent to child.

I met, some years ago, in a railway carriage the governor of one of our largest prisons. He was evidently an observant and reflective man, possessed of wide experience gathered in various parts of the world, and a thorough student of the duties of his vocation. He told me that the prisoners in his charge might be divided into three distinct classes. The first class consisted of persons who ought never to have been in prison. External accident, and not internal taint, had brought them within the grasp of the law, and what had happened to them might happen to most of us. They were essentially men of sound moral stamina, though wearing the prison garb. Then came the largest class, formed of individuals possessing no strong bias, moral or immoral, plastic to the touch of circumstances, which could mould them into either good or evil members of society. Thirdly came a class—happily not a large one—whom no kindness could conciliate and no discipline tame. They were sent into this world labelled "incorrigible," wickedness being stamped, as it were, upon their organizations. It was an unpleasant truth, but as a truth it ought to be faced. For such criminals the prison over which he ruled was certainly not the proper place. If confined at all, their prison should be on a desert island where the deadly contagium of their example could not taint the moral air. But the sea itself he was disposed to regard as a cheap and appropriate substitute for the island. It seemed to him evident that the State would benefit if prisoners of the first class were liberated; prisoners of the second class educated; and prisoners of the third class put compendiously under water.

It is not, however, from the observation of individuals that the argument against "free-will," as commonly understood, derives its principal force. It is, as already hinted, indefinitely strengthened when extended to the race. Most of you have been forced to listen to the outcries and denunciations which rang discordant through the land for some years after the publication of Mr. Darwin's "Origin of Species." Well, the world—even the clerical world—has for the most part settled down in the belief that Mr. Darwin's book simply reflects the truth of Nature: that we who are now "foremost in the files of time" have come to the front through almost endless stages of promotion from lower to higher forms of life.

If to any one of us were given the privilege of looking back through the æons across which life has crept towards its present outcome, his vision would ultimately reach a point when the progenitors of this assembly could not be called human. From that humble society, through the interaction of its members and the storing up of their best qualities, a better one emerged; from this again a better still; until at length, by the integration of infinitesimals through ages of amelioration, we came to be what we are to-day. We of this generation had no conscious share in the production of this grand and beneficent result. Any and every generation which preceded us had just as little share. The favored organisms whose garnered excellence constitutes our present store owed their advantages, firstly, to what we in our ignorance are obliged to call "accidental variation;" and, secondly, to a law of heredity in the passing of which our suffrages were not collected. With characteristic felicity and precision Mr. Matthew Arnold lifts this question into the free air of poetry, but not out of the atmosphere of truth, when he ascribes the process of amelioration to "a power not ourselves which makes for righteousness." If, then, our organisms, with all their tendencies and capacities, are given to us without our being consulted; and if, while capable of acting within certain limits in accordance with our wishes, we are not masters of the circumstances in which motives and wishes originate; if, finally, our motives and wishes determine our actions—in what sense can these actions be said to be the result of free-will?

Here, again, we are confronted with the question of moral responsibility, which it is desirable to meet in its rudest form, and in the most uncompromising way. "If," says the robber, the ravisher, or the murderer, "I act because I must act, what right have you to hold me responsible for my deeds?" The reply is, "The right of society to protect itself against aggressive and injurious forces, whether they be bond

or free, forces of nature or forces of man." "Then," retorts the criminal, "you punish me for what I cannot help." "Granted," says society, "but had you known that the treadmill or the gallows was certainly in store for you, you might have 'helped.' Let us reason the matter fully and frankly out. We entertain no malice or hatred against you, but simply with a view to our own safety and purification we are determined that you and such as you shall not enjoy liberty of evil action in our midst. You, who have behaved as a wild beast, we claim the right to cage or kill as we should a wild beast. The public safety is a matter of more importance than the very limited chance of your moral renovation, while the knowledge that you have been hanged by the neck may furnish to others about to do as you have done the precise motive which will hold them back. If your act be such as to invoke a minor penalty, then not only others, but yourself, may profit by the punishment which we inflict. On the homely principle that 'a burnt child dreads the fire,' it will make you think twice before venturing on a repetition of your crime. Observe, finally, the consistency of our conduct. You offend, because you cannot help offending, to the public detriment. We punish, because we cannot help punishing, for the public good. Practically, then, as Bishop Butler predicted, we act as the world acted when it supposed the evil deeds of its criminals to be the products of free-will."

"What," I have heard it argued, "is the use of preaching about duty, if a man's predetermined position in the moral world renders him incapable of profiting by advice?" Who knows that he is incapable? The preacher's last word is a factor in the man's conduct; and it may be a most important factor, unlocking moral energies which might otherwise remain imprisoned and unused. If the preacher thoroughly feel that words of enlightenment, courage, and admonition enter into the list of forces employed by Nature herself for man's amelioration, since she gifted man with speech, he will suffer no paralysis to fall upon his tongue. Dung the fig-tree hopefully, and not until its barrenness has been demonstrated beyond a doubt let the sentence go forth, "Cut it down, why cumbereth it the ground?"

I remember when a youth in the town of Halifax, some two-and-thirty years ago, attending a lecture given by a young man to a small but select audience. The aspect of the lecturer was earnest and practical, and his voice soon riveted attention. He spoke of duty, defining it as a debt owed, and there was a kindling vigor in his words which must have strengthened the sense of duty in the minds of those who heard him. No speculations regarding the freedom of the will could alter the fact that the words of that young man did me good. His name was George Dawson. He also spoke, if you will allow me to allude to it, of a social subject much discussed at the time—the Chartist subject of "levelling." Suppose, he said, two men to be equal at night, and that one rises at six, while the other sleeps till nine next morning, what becomes of your levelling? And in so speaking he made himself the mouthpiece of Nature, which, as we have seen, secures advance, not by the reduction of all to a common level, but by the encouragement and conservation of what is best.

It may be urged that, in dealing as above with my hypothetical criminal, I am assuming a state of things brought about by the influence of religions which include the dogmas of theology and the belief in free-will—a state namely in which a moral majority control and keep in awe an immoral minority. The heart of man is deceitful above all things, and desperately wicked. Withdraw, then, our theologic sanctions, including the belief in free-will, and the condition of the race will be typified by the samples of individual wickedness which have been adduced. We shall all, that is, become robbers, and ravishers, and murderers. From much that has been written of late it would seem that this astounding inference finds house-room in many minds. Possibly the people who hold such views might be able to illustrate them by individual instances.

> "The fear of hell's a hangman's whip,
> To keep the wretch in order."

Remove the fear, and the wretch following his natural instinct may become disorderly; but I refuse to accept him as a sample of humanity. "Let us eat and drink, for to-morrow we die," is by no means the ethical consequence of a rejection of dogma. To many of you the name of George Jacob Holyoake is doubtless

familiar, and you are probably aware that at no man in England has the term "atheist" been more frequently pelted. There are, moreover, really few who have more completely liberated themselves from theologic notions. Among working-class politicians Mr. Holyoake is a leader. Does he exhort his followers to "eat and drink, for to-morrow we die"? Not so. In the August number of the *XIXth Century* you will find these words from his pen: "The gospel of dirt is bad enough, but the gospel of mere material comfort is much worse." He contemptuously calls the Comtist championship of the workingman "the championship of the trencher." He would place "the leanest liberty which brought with it the dignity and power of self-help" higher than "any prospect of a full plate without it." Such is the moral doctrine taught by this "Atheistic" leader; and no Christian, I apprehend, need be ashamed of it.

Most heartily do I recognise and admire the spiritual radiance, if I may use the term, shed by religion on the minds and lives of many personally known to me. At the same time I cannot but observe how signally, as regards the production of anything beautiful, religion fails in other cases. Its professor and defender is sometimes at bottom a brawler and a clown. These differences depend upon primary distinctions of character which religion does not remove. It may comfort some to know that there are amongst us many whom the gladiators of the pulpit would call "atheists" and "materialists," whose lives, nevertheless, as tested by any accessible standard of morality, would contrast more than favorably with the lives of those who seek to stamp them with this offensive brand. When I say "offensive," I refer simply to the intention of those who use such terms, and not because atheism or materialism, when compared with many of the notions ventilated in the columns of religious newspapers, has any particular offensiveness for me. If I wished to find men who are scrupulous in their adherence to engagements, whose words are their bond, and to whom moral shiftiness of any kind is subjectively unknown; if I wanted a loving father, a faithful husband, an honorable neighbor, and a just citizen—I should seek him and find him among the band of "atheists" to which I refer. I have known some of the most pronounced among them not only in life but in death—seen them approaching with open eyes the inexorable goal, with no dread of a "hangman's whip," with no hope of a heavenly crown, and still as mindful of their duties, and as faithful in the discharge of them, as if their eternal future depended upon their latest deeds.

In letters addressed to myself, and in utterances addressed to the public, Faraday is often referred to as a sample of the association of religious faith with moral elevation. I was locally intimate with him for fourteen or fifteen years of my life, and had thus occasion to observe how nearly his character approached what might, without extravagance, be called perfection. He was strong but gentle, impetuous but self-restrained; a sweet and lofty courtesy marked his dealings with men and women; and though he sprung from the body of the people, a nature so fine might well have been distilled from the flower of antecedent chivalry. Not only in its broader sense was the Christian religion necessary to Faraday's spiritual peace, but in what many would call the narrow sense held by those described by Faraday himself as "a very small and despised sect of Christians, known, if known at all, as Sandemanians," it constituted the light and comfort of his days.

Were our experience confined to such cases, it would furnish an irresistible argument in favor of the association of dogmatic religion with moral purity and grace. But, as already intimated, our experience is not thus confined. In further illustration of this point we may compare with Faraday a philosopher of equal magnitude, whose character, including gentleness and strength, candor and simplicity, intellectual power and moral elevation, singularly resembles that of the great Sandemanian, but who has neither shared the theologic views nor the religious emotions which formed so dominant a factor in Faraday's life. I allude to Mr. Charles Darwin, the Abraham of scientific men—a searcher as obedient to the command of truth as was the patriarch to the command of God. I cannot, therefore, as so many desire, look upon Faraday's religious belief as the exclusive source of qualities shared so conspicuously by one uninfluenced by that belief. To a deeper virtue

belonging to reviled human nature in its purer forms I am disposed in refer the excellence of both.

Superstition may be defined as religion which has grown incongruous with intelligence. "Superstition," says Fichte, "has unquestionably constrained its subjects to abandon many pernicious practices and to adopt many useful ones." The real loss accompanying its decay at the present day has been thus clearly stated by the same philosopher: "In so far as these lamentations do not proceed from the priests themselves—whose grief at the loss of their dominion over the human mind we can well understand—but from the politicians, the whole matter resolves itself into this, that government has thereby become more difficult and expensive. The judge was spared the exercise of his own sagacity and penetration when, by threats of relentless damnation, he could compel the accused to make confession. The evil spirit formerly performed without reward services for which in later times judges and policemen have to be paid."

No man ever felt the need of a high and ennobling religion more thoroughly than this powerful and fervid teacher, who, by the way, did not escape the brand of "atheist." But Fichte asserted emphatically the power and sufficiency of morality in its own sphere. "Let us consider," he says, "the highest which man can possess in the absence of religion—I mean pure morality. The moral man obeys the law of duty in his breast absolutely, because it is a law unto him; and he does whatever reveals itself to him as his duty simply because it is duty. Let not the impudent assertion be repeated that such an obedience, without regard for consequences, and without desire for consequences, is in itself impossible and opposed to human nature." So much for Fichte. I would add that the muse of Tennyson never reached a higher strain than when it embodied the same sentiment in Ænone:—

> "And, because right is right, to follow right
> Were wisdom in the scorn of consequence."

Not in the way assumed by our dogmatic teachers has the morality of human nature been built up. The power which has moulded us thus far has worked with stern tools upon a very rigid stuff. What it has done cannot be so readily undone; and it has endowed us with moral constitutions which take pleasure in the noble, the beautiful, and the true, just as surely as it has endowed us with sentient organisms, which find aloes bitter and sugar sweet. That power did not work with delusions, nor will it stay its hand when such are removed. Facts, rather than dogmas, have been its ministers—hunger and thirst, heat and cold, pleasure and pain, fervor, sympathy, shame, pride, love, hate, terror, awe—such were the forces whose interaction and adjustment throughout an immeasurable past wove the triplex web of man's physical, intellectual, and moral nature, and such are the forces that will be effectual to the end.*

You may retort that even on my own showing "the power which makes for righteousness" *has* dealt in delusions; for it cannot be denied that the beliefs of religion, including the dogmas of theology and the freedom of the will, have had some effect in moulding the moral world. Granted; but I do not think that this goes to the root of the matter. Are you quite sure that those beliefs and dogmas are primary, and not derived?—that they are not the *products*, instead of being the *creators*, of man's moral nature? I think it is in one of the Latter-Day Pamphlets that Carlyle corrects a reasoner, who deduced the nobility of man from a belief in heaven, by telling him that he puts the cart before the horse, the real truth being that the belief in heaven is derived from the nobility of man. The bird's instinct to weave its nest is referred to by Emerson as typical of the force which built cathedrals, temples, and pyramids:—

> "Knowest thou what wove yon woodbird's nest
> Of leaves and feathers from her breast,
> Or how the fish outbuilt its shell,
> Painting with morn each annual cell,
> Such and so grew these holy piles
> While love and terror laid the tiles;
> Earth proudly wears the Parthenon
> As the best gem upon her zone;
> And Morning opes with haste her lids
> To gaze upon the Pyramids;
> O'er England's abbeys bends the sky
> As on its friends with kindred eye;
> For out of Thought's interior sphere

* My *Spectator* critic says that I give up *approbation* and *disapprobation*; but, as already indicated, the critic writes hastily. Each of them is a subsection of one or another of the influences mentioned above.

These wonders rose to upper air,
And nature gladly gave them place,
Adopted them into her race,
And granted them an equal date
With Andes and with Ararat."

Surely, many utterances which have been accepted as descriptions ought to be interpreted as aspirations, or as having their roots in aspiration instead of in objective knowledge. Does the song of the herald angels, "Glory to God in the highest, and on earth peace and goodwill towards men," express the exaltation and the yearning of a human soul? or does it describe an optical and acoustical fact—a visible host and an audible song? If the former, the exaltation and the yearning are man's imperishable possession—a ferment long confined to individuals, but which may by-and-by become the leaven of the race. If the latter, then belief in the entire transaction is wrecked by nonfulfilment. Look to the East at the present moment as a comment on the promise of peace on earth and goodwill towards men. That promise is a dream ruined by the experience of eighteen centuries, and in that ruin is involved the claim of the "heavenly host" to prophetic vision. But though the mechanical theory proves untenable, the immortal song and the feelings it expresses are still ours, to be incorporated, let us hope, in purer and less shadowy forms in the poetry, philosophy, and practice of the future.

Thus, following the lead of physical science, we are brought without solution of continuity into the presence of problems which, as usually classified, lie entirely outside the domain of physics. To these problems thoughtful and penetrative minds are now applying those methods of research which in physical science have proved their truth by their fruit. There is on all hands a growing repugnance to invoke the supernatural in accounting for the phenomena of human life, and the thoughtful minds just referred to, finding no trace of evidence in favor of any other origin, are driven to seek in the interaction of social forces the genesis and development of man's moral nature. If they succeed in their search—and I think they are sure to succeed—social duty will be raised to a higher level of significance, and the deepening sense of social duty will, it is to be hoped, lessen, if not obliterate, the strifes and heartburnings which now beset and disfigure our social life. Towards this great end it behoves us one and all to work; and devoutly wishing its consummation, I have the honor, ladies and gentlemen, to bid you a friendly farewell.—*Fortnightly Review.*

CHARLES DICKENS' MANUSCRIPTS.

A GLIMPSE of the manuscripts of the late Charles Dickens, which now form part of the 'Forster Collection' in the South Kensington Museum, conjures up a vision of numerous characters in his popular novels. On looking attentively at the manuscripts, we are at once struck by the number of alterations and interlineations with which the pages abound; and our first sentiment is one of surprise that the books which appear so wonderfully natural and fluent when we read them, should evidently have been the result of much anxious thought, care, and elaboration.

The collection comprises the original manuscripts of the following works: *Oliver Twist*, published in 1838–39; *Master Humphrey's Clock*, comprising the *Old Curiosity Shop* and *Barnaby Rudge*, published in 1840–41; *Barnaby Rudge*, a separate volume, 1840–41; *American Notes*, 1842; *Martin Chuzzlewit*, 1843–44; *The Chimes*, Christmas 1844; *Dombey and Son*, 1846–48; *David Copperfield*, 1849–50; *Bleak House*, which has in the original manuscript a secondary title, *The East Wind*, 1852–53; *Hard Times*, 1854; *Little Dorrit*, 1855–57; *A Tale of Two Cities*, 1859; and *The Mystery of Edwin Drood* (his last but unfinished work), 1870. There are also proof volumes from the printers, consisting of *Dombey and Son*, *David Copperfield*, *Bleak House*, and *Little Dorrit*, the pages of which bear marginal and other corrections and alterations, in ink, by the author.

Of course, as the collection is placed under a glass case, the public can only see one or two pages of each work; but even with this meagre guide, the acute observer is able in some degree to trace the working of the writer's mind, and to follow to some extent the development of his ideas. As we have already remarked, the first

thing which strikes us is the comparatively large number of alterations and interlineations which occur in the manuscript. It is evident that Charles Dickens wrote with the greatest care, and scrupulously revised his writing, in order to render each sentence as perfect as might be. Taking the works in their chronological order, we may notice that in *Oliver Twist*, which is open at 'Chapter the Twelfth'—'In which Oliver is taken better care of than he ever was before, with some particulars concerning a certain picture'—there are few alterations in the manuscript; the writing also being larger and firmer than in the majority of the later works. Charles Dickens made his alterations so carefully that it is difficult to trace the words which he had originally written; but the one or two which occur on this page give us some little insight into the careful manner in which the author worked up his sentences into a well-rounded and euphonious form. The passage at which this manuscript is opened runs as follows: 'The coach rattled away down Mount Pleasant and up Exmouth Street—over nearly the same ground as that which Oliver had traversed when he first entered London in;' and here occurs the first alteration, 'the D——' is erased, and 'company with the Dodger' is written in its place; the author evidently considering the latter a more euphonious form of expression than 'in the Dodger's company,' as it was doubtless his original intention to make the passage. The alteration to which we have referred may appear, as indeed it is, of exceedingly small significance; but we have mentioned it simply as an instance of the extremely careful way in which Dickens studied the details and minutiæ of composition.

The next manuscript in point of date is *Master Humphrey's Clock*, which is open at 'No. IV.,' headed 'Master Humphrey from his clock-side in the chimney corner,' and commences as follows: 'Night is generally my time for walking. In the summer I often leave home early in the morning and roam about fields and lanes all day, or even escape for days or weeks together, but, saving in the country' [this originally stood 'but, at other seasons of the year;' but Dickens doubtless saw that the expression as it now stands would be more consistent with the context], 'I seldom go out until after dark, though, Heaven be thanked, I love its light and feel the cheerfulness it sheds upon the earth as much as any creature living.' This page of manuscript has only a moderate share of alterations.

Then we come to the volume of *Barnaby Rudge*, which is opened at 'Chapter One,' and also contains only a moderate number of alterations, one being in the height of the *Maypole* sign, and another in the distance of Epping Forest from Cornhill; both of which are noticeable as further illustrations of the conscientious love of accuracy which characterised the author's mind. Next in order follows the *American Notes*, which has very few corrections, and is opened at the page headed 'Chapter the First. Introductory and necessary to be read;' in which the author challenges the right of any person 'to pass judgment on this book or to arrive at any reasonable conclusion in reference to it without first being at the trouble of becoming acquainted with its design and purpose.' Surely a caution fair and reasonable enough on the part of the writer of a book which he could not but feel would probably give offence, where such an end was farthest from his wish.

The Life and Adventures of Martin Chuzzlewit comes next, open at 'Chapter I. Introductory. Concerning the Pedigree of the Chuzzlewit Family;' and giving us a brief but telling satire on the pride of birth by assuring us that this family 'undoubtedly descended in a direct line from Adam and Eve, and was in the very earliest times closely connected with the agricultural interest.' This page is notably full of alterations, and seems a fair indication that with Charles Dickens, as with many others, the first step was the most difficult of all. The caligraphy in this as in all the other manuscripts is legible but rather small, the letters being distinctly formed, and the use of abbreviations studiously avoided.

We next turn to *The Chimes*, one of those delightful stories with which Dickens introduced to us those Christmas annuals, which now form so important a section of our periodical literature. This again is open at the commencement, where the author lays down the dogma that there are not many people who would care to sleep in a church: 'I don't mean at sermon-time in warm weather (when the thing has actually been done once or

twice), but in the night, and alone.' This sentence originally finished with 'in the night;' but we can readily imagine the development of the idea in the brain of the writer; and the words 'and alone' suggesting themselves as lending an additional ground of fear for the situation. The manuscript of this page bears a moderate number of alterations.

In *Dombey and Son* we find a large number of alterations on the first page, the very title itself having been altered more than once. The sketch of the newly-born Paul, who was placed in front of the fire, 'as if his constitution were analogous to that of a muffin, and it was essential to toast him brown while he was very new,' is very good indeed; but it is evident that the passage was rather the result of careful elaboration than of spontaneous humor. And the same remark will apply to the opening chapter of *David Copperfield*, in which, although the passage descriptive of the birth of the hero is very neat and natural as it now stands, the same careful revision and alteration are again apparent.

Bleak House too is notably full of alterations on the first page, especially in the passage which tells us that in the muddy condition of the London streets 'it would not be wonderful to meet a Mesalosaurus forty feet long or so waddling like an elephantine lizard up Holborn Hill.'

In *Hard Times*, where we are introduced to the gentleman who wants nothing but 'Facts,' and in the opening chapter of *Little Dorrit*, in which we have a description of Marseilles as it 'lay broiling in the sun one day,' we find a large number of alterations; but in these, as in most of the other instances, the primary words have been erased so carefully, that it is next to impossible to form an idea of how the passages originally stood. The *Tale of Two Cities*, on the contrary, contains remarkably few corrections; and the opening passage descriptive of 'The Period' is telling, and apparently written spontaneously. *The Mystery of Edwin Drood* has been opened with good judgment at the last page. The manuscript is very small, but fairly legible, and having but a moderate number of alterations. In a literary sense, it is not perhaps so interesting as some of the others; but it possesses a sad and melancholy claim upon our attention and sympathy, inasmuch as it is the last page of manuscript ever written by this gifted hand.

In the proof volumes with corrections in the handwriting of the author there is nothing which calls for especial note save an unimportant deletion in *Bleak House*, and a more interesting alteration in *David Copperfield*. In the former there is a passage marked 'out,' in which Sir Leicester Dedlock speaks to Mrs. Rouncewell of her grandson in the following passage: 'If (he said) the boy could not settle down at Chesney Wold, in itself the most astonishing circumstance in the world, could he not serve his country in the ranks of her defenders, as his brother had done? Must he rush to her destruction at his early age and with his parricidal hand strike at her?'

In *David Copperfield* we find by a passage in which Mr. Dick is referring to his Memorial that his original hallucination took the form of a 'bull in a china shop;' a rather trite idea, and it was not until after the proof had actually been submitted to him by the printers that Charles Dickens introduced the whimsical and happier notion of 'King Charles's Head.'

We have no doubt that many of those who read this short article will have seen the Dickens manuscripts for themselves; many more doubtless will see them; but there will still be a large number who will not have the opportunity; and while we think that our remarks will be endorsed by the first and second classes, we hope that they will prove interesting to the third less fortunate class, and will enable them to enjoy, at least in imagination, a somewhat closer intimacy than they have known before with that great and gifted man, whose books have effected so many beneficial changes both in society at large and in many an individual heart and life, uprooting and casting to the winds much that was base, worthless, and contemptible, and implanting in their stead the seeds of those gentler sympathies and nobler aspirations which find their fruition in a well-spent life.—*Chambers' Journal.*

A MIGHTY SEA-WAVE.

On May 10th last a tremendous wave swept the Pacific Ocean from Peru northwards, westwards, and southwards, travelling at a rate many times greater than that of the swiftest express train. For reasons best known to themselves, writers in the newspapers have by almost common consent called this phenomenon a tidal wave. But the tides have had nothing to do with it. Unquestionably the wave resulted from the upheaval of the bed of the ocean in some part of that angle of the Pacific Ocean which is bounded by the shores of Peru and Chili. This region has long been celebrated for tremendous submarine and subterranean upheavals. The opinions of geologists and geographers have been divided as to the real origin of the disturbances by which at one time the land, at another time the sea, and at yet other times (oftener in fact than either of the others) both land and sea have been shaken as by some mighty imprisoned giant struggling, like Prometheus, to cast from his limbs the mountain masses which hold them down. Some consider that the seat of the Vulcanian forces lies deep below that part of the chain of the Andes which lies at the apex of the angle just mentioned, and that the direction of their action varies according to the varying conditions under which the imprisoned gases find vent. Others consider that there are two if not several seats of subterranean activity. Yet others suppose that the real seat of disturbance lies beneath the ocean itself, a view which seems to find support in several phenomena of recent Peruvian earthquakes.

Although we have not as yet full information concerning the great wave which in May last swept across the Pacific and northwards and southwards along the shores of the two Americas, it may be interesting to consider some of the more striking features of this great disturbance of the so-called peaceful ocean, and to compare them with those which have characterized former disturbances of a similar kind. We may thus, perhaps, find some evidence by which an opinion may be formed as to the real seat of subterranean activity in this region.

It may seem strange, in dealing with the case of a wave which apparently had its origin in or near Peru on May 9, to consider the behavior of a volcano, distant 5000 miles from this region, a week before the disturbance took place. But, although the coincidence may possibly have been accidental, yet in endeavoring to ascertain the true seat of disturbance we must overlook no evidence, however seemingly remote, which may throw light on that point; and as the sea-wave generated by the disturbance reached very quickly the distant region referred to, it is by no means unlikely that the subterranean excitement, which the disturbance relieved may have manifested its effects beforehand at the same remote volcanic region. Be this as it may, it is certain that on May 1 the great crater of Kilauea, in the island of Hawaii, became active, and on the 4th severe shocks of earthquake were felt at the Volcano House. At three in the afternoon a jet of lava was thrown up to a height of about 100 feet, and afterwards some fifty jets came into action. Subsequently jets of steam issued along the line formed by a fissure four miles in length down the mountain side. The disturbance lessened considerably on the 5th, and an observing party examined the crater. They found that a rounded hill, 700 feet in height, and 1400 feet in diameter, had been thrown up on the plain which forms the floor of the crater. Fire and scoria were spouted up in various places.

Before rejecting utterly the belief that the activity thus exhibited in the Hawaii volcano had its origin in the same subterrene or submarine region as the Peruvian earthquake, we should remember that other regions scarcely less remote have been regarded as forming part of this great vulcanian district. The violent earthquakes which occurred at New Madrid, in Missouri, in 1812, took place at the same time as the earthquake of Caraccas, the West Indian volcanoes being simultaneously active; and earthquakes had been felt in South Carolina for several months before the destruction of Caraccas and La Guayra. Now we have abundant evidence to show that the West Indian volcanoes are connected with the Peruvian and Chilian regions of vulcanian energy,

and the Chilian region is about as far from New Madrid as Arica in Peru from the Sandwich Isles.

It was not, however, until about half-past eight on the evening of May 9 that the Peruvian earthquake began. A severe shock, lasting from four to five minutes, was felt along the entire southern coast, even reaching Autofagasta. The shock was so severe that it was impossible, in many places, to stand upright. It was succeeded by several others of less intensity.

While the land was thus disturbed, the sea was observed to be gradually receding, a movement which former experiences have taught the Peruvians to regard with even more terror than the disturbance of the earth itself. The waters which had thus withdrawn, as if concentrating their energies to leap more fiercely on their prey, presently returned in a mighty wave, which swept past Callao, travelling southwards with fearful velocity, while in its train followed wave after wave, until no less than eight had taken their part in the work of destruction. At Mollendo the railway was torn up by the sea for a distance of 300 feet. A violent hurricane which set in afterwards from the south prevented all vessels from approaching, and unroofed most of the houses in the town. At Arica the people were busily engaged in preparing temporary fortifications to repel a threatened assault of the rebel ram *Huiscar*, at the moment when the roar of the earthquake was heard. The shocks here were very numerous, and caused immense damage in the town, the people flying to the Morro for safety. The sea was suddenly perceived to recede from the beach, and a wave from ten feet to fifteen feet in height rolled in upon the shore, carrying before it all that it met. Eight times was this assault of the ocean repeated. The earthquake had levelled to the ground a portion of the custom-house, the railway-station, the submarine cable office, the hotel, the British Consulate, the steamship agency, and many private dwellings. Owing to the early hour of the evening, and the excitement attendant on the proposed attack of the *Huiscar*, every one was out and stirring; but the only loss of life which was reported is that of three little children who were overtaken by the water. The progress of the wave was only stopped at the foot of the hill on which the church stands, which point is further inland than that reached in August, 1868. Four miles of the embankment of the railway were swept away like sand before the wind. Locomotives, cars, and rails were hurled about by the sea like so many playthings, and left in a tumbled mass of rubbish.

The account proceeds to say that the United States' steamer *Waters*, stranded by the bore of 1868, was lifted up bodily by the wave at Arica and floated two miles north of her former position. The reference is no doubt to the double-ender *Waterree*, not stranded by a bore (a term utterly inapplicable to any kind of sea-wave at Arica, where there is no large river), but carried in by the great wave which followed the earthquake of August 13. The description of the wave at Arica on that occasion should be compared with that of the wave last May. About twenty minutes after the first earth shock the sea was seen to retire as if about to leave the shores wholly dry; but presently its waters returned with tremendous force. A mighty wave, whose length seemed immeasurable, was seen advancing like a dark wall upon the unfortunate town, a large part of which was overwhelmed by it. Two ships, the Peruvian corvette *America*, and the American double-ender *Waterree*, were carried nearly half a mile to the north of Arica, beyond the railroad which runs to Tacna, and there left stranded high and dry. As the English vice-consul at Arica estimated the height of this enormous wave at fully fifty feet, it would not seem that the account of the wave of last May has been exaggerated, for a much less height is, as we have seen, attributed to it, though, as it carried the *Waterree* still farther inland, it must have been higher. The small loss of life can be easily understood, when we consider that the earthquake was not followed instantly by the sea-wave. Warned by the experience of the earthquake of 1868, which most of them must have remembered, the inhabitants sought safety on the higher grounds until the great wave and its succesors had flowed in. We read that the damage done was greater than that caused by the previous calamity, the new buildings erected since 1868 being of a more costly and substantial class. Merchandise from the custom-house and stores was carried by the water

to a point on the beach five miles distant.

At Iquique, in 1868, the great wave was estimated at fifty feet in height. We are told that it was black with the mud and slime of the sea bottom. "Those who witnessed its progress from the upper balconies of their houses, and presently saw its black mass rushing close beneath their feet, looked on their safety as a miracle. Many buildings were, indeed, washed away, and in the low-lying parts of the town there was a terrible loss of life." Last May the greatest mischief at Iquique would seem to have been caused by the earthquake, not by the sea-wave, though this also was destructive in its own way. "Iquique," we are told, "is in ruins. The movement was experienced there at the same time and with the same force [as at Arica]. Its duration was exactly four minutes and a third. It proceeded from the south-east, exactly from the direction of Ilaga." The houses built of wood and cane tumbled down at the first attack, lamps were broken, and the burning oil spread over and set fire to the ruins. Three companies of firemen, German, Italian, and Peruvian, were instantly at their posts, although it was difficult to maintain an upright position, shock following shock with dreadful rapidity. Nearly 400,000 quintals of nitrate in the stores at Iquique and the adjacent ports of Molle and Pisagua were destroyed. The British barque *Caprera* and a German barque sank, and all the coasting craft and small boats in the harbor were broken to pieces and drifted about in every direction.

At Chanavaya, a small town at the guano-loading deposit known as Pabellon de Pica, only two houses were left standing out of four hundred. Here the earthquake shock was specially severe. In some places the earth opened in crevices seventeen yards deep, and the whole surface of the ground was changed. The shipping along the Peruvian and Bolivian coast suffered terribly. The list of vessels lost or badly injured at Pabellon de Pica alone reads like the list of a fleet.

We have been particular in thus describing the effects produced by the earthquake and sea-wave on the shores of South America, in order that the reader may recognise in the disturbance produced there the real origin of the great wave which a few hours later reached the Sandwich Isles, 5,000 miles away. Doubt has been entertained respecting the possibility of a wave, other than the tidal wave, being transmitted right across the Pacific. Although in August 1868 the course of the great wave which swept from some region near Peru, not only to the Sandwich Isles, but in all directions over the entire ocean, could be clearly traced, there were some who considered the connection between the oceanic phenomena and the Peruvian earthquake a mere coincidence. It is on this account perhaps chiefly that the evidence obtained last May is most important. It is interesting, indeed, as showing how tremendous was the disturbance which the earth's frame must then have undergone. It would have been possible, however, had we no other evidence, for some to have maintained that the wave which came in upon the shores of the Sandwich Isles a few hours after the earthquake and sea disturbance in South America was in reality an entirely independent phenomenon. But when we compare the events which happened last May with those of August 1868, and perceive their exact similarity, we can no longer reasonably entertain any doubt of the really stupendous fact that *the throes of the earth in and near Peru are of sufficient energy to send an oceanic wave right across the Pacific*, and of such enormous height at starting that, after travelling with necessarily diminishing height the whole way to Hawaii, it still rises and falls through thirty-six feet. The real significance of this amazing oceanic disturbance is exemplified by the wave-circles which spread around the spot where a stone has fallen into a smooth lake. We know how, as the circle widens, the height of the wave grows less and less, until at no great distance from the centre of disturbance the wave can no longer be discerned, so slight is the slope of its advancing and following faces. How tremendous, then, must have been the upheaval of the bed of ocean by which wave-circles were sent across the Pacific, retaining, after travelling five thousand miles from the centre of disturbance, the height of a two-storied house. In 1868, indeed, we know (now even more certainly than then) that the wave travelled very much farther, reaching the shores of Japan, of New Zealand, and of Australia, even if it did not make

its way through the East Indian Archipelago to the Indian Ocean, as some observations seem to show. Doubtless we shall hear in the course of the next few months of the corresponding effects of the spread of last May's mighty wave athwart the Pacific, though the dimensions of the wave of last May, when it reached the Sandwich Isles, fell far short of those of the great wave of August 13–14, 1868.

It will be well to make a direct comparison between the waves of May last and August 1868 in this respect, as also with regard to the rate at which they would seem to have traversed the distance between Peru and Hawaii. On this last point, however, it must be noted that we cannot form an exact opinion until we have ascertained the real region of vulcanian disturbance on each occasion. It is possible that a careful comparison of times, and of the direction in which the wave front advanced upon different shores, might serve to show where this region lay. We should not be greatly surprised to learn that it was far from the continent of South America.

The great wave reached the Sandwich Isles between four and five on the morning of May 10, corresponding to about five hours later of Peruvian time. An oscillation only was first observed at Hilo, on the east coast of the great southern island of Hawaii, the wave itself not reaching the village till about a quarter before five. The greatest difference between the crest and trough of the wave was found to be thirty-six feet here; but at the opposite side of the island, in Kealakekua Bay (where Captain Cook died), amounted only to thirty feet. In other places the difference was much less, being in some only three feet, a circumstance doubtless due to interference, waves which had reached the same spot along different courses chancing so to arrive that the crest of one corresponded with the trough of the other, so that the resulting wave was only the difference of the two. We must explain, however, in the same way, the highest waves of thirty-six to forty feet, which were doubtless due to similar interference, crest agreeing with crest and trough with trough, so that the resulting wave was the sum of the two which had been divided, and had reached the same spot along different courses. It would follow that the higher of the two waves was twenty-one feet high, the lower about eighteen feet high; but as some height would be lost in the encounter with the shore line, wherever it lay, on which the waves divided, we may fairly assume that in the open ocean, before reaching the Sandwich group, the wave had a height of nearly thirty feet from trough to crest. We read, in accordance with this explanation, that "the regurgitations of the sea were violent and complex, and continued through the day."

The wave, regarded as a whole, seems to have reached all the islands at the same time. If this is confirmed by later accounts, we shall be compelled to conclude that the wave reached the group with its front parallel to the length of the group, so that it must have come (arriving as it did from the side towards which Hilo lies) from the north-east. It was then not the direct wave from Peru, but the wave reflected from the shores of California, which produced the most marked effects. We can understand well, this being so, that the regurgitations of the sea were complex. Any one who has watched the inflow of waves on a beach so lying within an angle of the shore, that while one set of waves comes straight in from the sea another thwart set comes from the shore forming the other side of the angle, will understand how such waves differ from a set of ordinary rollers. The crests of the two sets form a sort of network, ever changing as each set rolls on; and considering any one of the four-cornered meshes of this wave-net, the observer will notice that while the middle of the raised sides rises little above the surrounding level, because here the crests of one set cross the troughs of the other, the corners of each quadrangle are higher than they would be in either set taken separately, while the middle of the four-cornered space is correspondingly depressed. The reason is that at the corners of the wave-net crests join with crests to raise the water surface, which in the middle of the net (not the middle of the sides, but the middle of the space enclosed by the four sides) trough joins with trough to depress the water surface.*

* The phenomena here described are well worth observing on their own account as affording a very instructive and at the same time very beautiful illustration of wave motions. They can be well seen at many of our watering

We must take into account the circumstance that the wave which reached Hawaii last May was probably reflected from the Californian coast when we endeavor to determine the rate at which the sea disturbance was propagated across the Atlantic. The direct wave would have come sooner, and may have escaped notice because arriving in the night-time, as it would necessarily have done if a wave which travelled to California, and thence, after reflexion, to the Sandwich group, arrived there at a quarter before five in the morning following the Peruvian earthquake. We shall be better able to form an opinion on this point after considering what happened in August 1868.

The earth throe on that occasion was felt in Peru about five minutes past five on the evening of August 13. Twelve hours later, or shortly before midnight, August 13, Sandwich Island time (corresponding to 5 p.m., August 14, Peruvian time), the sea round the group of the Sandwich Isles rose in a surprising manner, "insomuch that many thought the islands were sinking, and would shortly subside altogether beneath the waves. Some of the smaller islands were for a time completely submerged. Before long, however, the sea fell again, and as it did so the observers found it impossible to resist the impression that the islands were rising bodily out of the water. For no less than three days this strange oscillation of the sea continued to be experienced, the most remarkable ebbs and floods being noticed at Honolulu, on the island of Woahoo."

The distance between Honolulu and Arica is about 6300 statute miles; so that, if the wave travelled directly from the shores of Peru to the Sandwich Isles, it must have advanced at an average rate of about 525 miles an hour (about 450 knots an hour). This is nearly half the rate at which the earth's surface near the equator is carried round by the earth's rotation, or is about the rate at which parts in latitude 62 or 63 degrees north are carried round by rotation; so that the motion of the great wave in 1868 was fairly comparable with one of the movements which we are accustomed to regard as cosmical. We shall presently have something more to say on this point.

Now last May, as we have seen, the wave reached Hawaii at about a quarter to five in the morning, corresponding to about ten Peruvian time. Since, then, the earthquake was felt in Peru at half-past eight on the previous evening, it follows that the wave, if it travelled directly from Peru, must have taken about 13½ hours, or an hour and a half longer, in travelling from Peru to the Sandwich Isles, than it took in August 1868. This is unlikely because ocean waves travel nearly at the same rate in the same parts of the ocean, whatever their dimensions, so only that they are large. We have, then, in the difference of time occupied by the wave in May last and in August 1868, in reaching Hawaii, some corroboration of the result to which we were led by the arrival of the wave simultaneously at all the islands of the Sandwich group—the inference, namely, that the observed wave had reached these islands after reflexion from the Californian shore line. As the hour when the direct wave probably reached Hawaii was about a quarter past three in the morning, when not only was it night-time but also a time when few would be awake to notice the rise and fall of the sea, it seems not at all improbable that the direct wave escaped notice, and that the wave actually observed, was the reflected wave from California. The direction, also, in which the oscillation was first observed corresponds well with this explanation.

It is clear that the wave which traversed the Pacific last May was somewhat inferior in size to that of August 1868, which therefore still deserves to be called (as then by the present writer) the greatest sea-wave ever known. The earthquake, indeed, which preceded the oceanic disturbance of 1868 was far more destructive than that of May last, and the waves which came in upon the Peruvian and Bolivian shores were larger. Nevertheless, the wave of last May was not so far inferior to that of August 1868 but that we may expect to hear of its course being traced athwart the entire extent of the Pacific Ocean.

When we consider the characteristic

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places. The same laws of wave motion can be readily illustrated also by throwing two stones into a large smooth pool at points a few yards apart. The crossing of the two sets of circular waves produces a wave-net, the meshes of which vary in shape according to their position.

features of the Peruvian and Chilian earthquakes, and especially when we note how wide is the extent of the region over which their action is felt in one way or another, it can scarcely be doubted that the earth's vulcanian energies are at present more actively at work throughout that region than in any other. There is nothing so remarkable, one may even say so stupendous, in the history of subterranean disturbance as the alternation of mighty earth-throes by which, at one time, the whole of the Chilian Andes seemed disturbed and anon the whole of the Peruvian Andes. In Chili scarce a year ever passes without earthquakes, and the same may be said of Peru; but so far as great earthquakes are concerned the activity of the Peruvian region seems to synchronise with the comparative quiescence of the Chilian region, and *vice versâ*. Thus, in 1797, the terrible earthquake occurred known as the earthquake of Riobamba, which affected the entire Peruvian earthquake region. Thirty years later a series of tremendous throes shook the whole of Chili, permanently elevating the whole line of coast to the height of several feet. During the last ten years the Peruvian region has in turn been disturbed by great earthquakes. It should be added that between Chili and Peru there is a region about five hundred miles in length in which scarcely any volcanic action has been observed. And singularly enough, "this very portion of the Andes, to which one would imagine that the Peruvians and Chilians would fly as to a region of safety, is the part most thinly inhabited; insomuch that, as Von Buch observes, it is in some places entirely deserted."

One can readily understand that this enormous double region of earthquakes, whose oscillations on either side of the central region of comparative rest may be compared to the swaying of a mighty see-saw on either side of its point of support, should be capable of giving birth to throes propelling sea-waves across the Pacific Ocean. The throe actually experienced at any given place is relatively but an insignificant phenomenon, it is the disturbance of the entire region over which the throe is felt which must be considered in attempting to estimate the energy of the disturbing cause. The region shaken by the earthquake of 1868, for instance, was equal to at least a fourth of Europe, and probably to fully one-half. From Quito southwards as far as Iquique—or along a full third part of the length of the South American Andes—the shock produced destructive effects. It was also distinctly felt far to the north of Quito, far to the south of Iquique, and inland to enormous distances. The disturbing force which thus shook 1,000,000 square miles of the earth's surface must have been one of almost inconceivable energy. If directed entirely to the upheaval of a land region no larger than England, those forces would have sufficed to have destroyed utterly every city, town, and village within such a region; if directed entirely to the upheaval of an oceanic region, they would have been capable of raising a wave which would have been felt on every shore-line of the whole earth. Divided even between the ocean on the one side and a land region larger than Russia in Europe on the other, those vulcanian forces shook the whole of the land region and sent athwart the largest of our earth's oceans a wave which ran in upon shores 10,000 miles from the centre of disturbance with a crest thirty feet high. Forces such as these may fairly be regarded as cosmical; they show unmistakably that the earth has by no means settled down into that condition of repose in which some geologists still believe. We may ask with the late Sir Charles Lyell whether, after contemplating the tremendous energy thus displayed by the earth, any geologist will continue to assert that the changes of relative level of land and sea, so common in former ages of the world, have now ceased? and agree with him that if, in the face of such evidence, a geologist persists in maintaining this favorite dogma, it would be vain to hope, by accumulating proofs of similar convulsions during a series of ages, to shake the tenacity of his conviction—

> Si fractus illabatur orbis,
> Impavidum ferient ruinæ.

But there is one aspect in which such mighty sea-waves as, in 1868 and again last May, have swept over the surface of our terrestrial oceans, remains yet to be considered.

The oceans and continents of our earth must be clearly discernible from her nearer neighbors among the planets—from Venus and Mercury on the inner side of

her path around the sun, and from Mars (though under less favorable conditions) from the outer side. When we consider, indeed, that the lands and seas of Mars can be clearly discerned with telescopic aid from our earth at a distance of forty millions of miles, we perceive that our earth, seen from Venus at little more than half this distance, must present a very interesting appearance. Enlarged, owing to greater proximity, nearly fourfold, having a diameter nearly twice as great as that of Mars, so that at the same distance her disc would seem more than three times as large, more brightly illuminated by the sun in the proportion of about five to two, she would shine with a lustre exceeding that of Mars, when in full brightness in the midnight sky, about thirty times; and all her features would of course be seen with correspondingly increased distinctness. Moreover, the oceans of our earth are so much larger in relative extent than those of Mars, covering nearly three-fourths instead of barely one-half of the surface of the world they belong to, that they would appear as far more marked and characteristic features than the seas and lakes of Mars. When the Pacific Ocean, indeed, occupies centrally the disc of the earth which at the moment is turned towards any planet, nearly the whole of that disc must appear to be covered by the ocean. Under such circumstances the passage of a wide-spreading series of waves over the Pacific, at the rate of about 500 miles an hour, is a phenomenon which could scarcely fail to be discernible from Venus or Mercury, if either planet chanced to be favorably placed for the observation of the earth—always supposing there were observers in Mercury or Venus, and that these observers were provided with powerful telescopes.

It must be remembered that the waves which spread over the Pacific on August 13–14, 1868, and again on May 9–10 last, were not only of enormous range in length (measured along crest or trough), but also of enormous breadth (measured from crest to crest, or from trough to trough). Were it otherwise, indeed, the progress of a wave forty or fifty feet high (at starting, and thirty-five feet after travelling 6,000 miles), at the rate of 500 miles per hour, must have proved destructive to ships in the open ocean as well as along the shore line. Suppose, for instance, the breadth of the wave from crest to crest one mile, then, in passing under a ship at the rate of 500 miles per hour, the wave would raise the ship from trough to crest —that is, through a height of forty feet— in one-thousandth part of an hour (for the distance from trough to crest is but half the breadth of the wave), or in less than four seconds, lowering it again in the same short interval of time, lifting and lowering it at the same rate several successive times. The velocity with which the ship would travel upwards and downwards would be greatest when she was midway in her ascent and descent, and would then be equal to about the velocity with which a body strikes the ground after falling from a height of four yards. It is hardly necessary to say that small vessels subjected to such tossing as this would inevitably be swamped. On even the largest ships the effect of such motion would be most unpleasantly obvious. Now, as a matter of fact, the passage of the great sea-wave in 1868 was not noticed at all on board ships in open sea. Even within sight of the shore of Peru, where the oscillation of the sea was most marked, the motion was such that its effects were referred to the shore. We are told that observers on the deck of a United States war-steamer distinctly saw the "peaks of the mountains in the chain of the Cordilleras wave to and fro like reeds in a storm;" the fact really being that the deck on which they stood was swayed to and fro. This, too, was in a part of the sea where the great wave had not attained its open sea form, but was a rolling wave, because of the shallowness of the water. In the open sea, we read that the passage of the great sea-wave was no more noticed than is the passage of the tidal wave itself. "Among the hundreds of ships which were sailing upon the Pacific when its length and breadth were traversed by the great sea-wave, there was not one in which any unusual motion was perceived." The inference is clear, that the slope of the advancing and following faces of the great wave was very much less than in the case above imagined; in other words, that the breadth of the wave greatly exceeded one mile—amounting, in fact, to many miles.

Where the interval between the passage of successive wave-crests was noted, we can tell the actual breadth of the wave.

Thus, at the Samoan Isles, in 1868, the crests succeeded each other at intervals of sixteen minutes, corresponding to eight minutes between crest and trough. As we have seen, that if the waves were one mile in breadth, the corresponding interval would be only four seconds, or only 120th part of eight minutes, it would follow that the breadth of the great wave, where it reached the Samoan Isles in 1868, was about 120 miles.

Now a wave extending right athwart the Pacific Ocean, and having a cross breadth of more than 100 miles, would be discernible as a marked feature of the disc of our earth, seen, under the conditions described above, either from Mercury or Venus. It is true that the slope of the wave's advancing and following surfaces would be but slight, yet the difference of illumination under the sun's rays would be recognisable. Then, also, it is to be remembered that there was not merely a single wave, but a succession of many waves. These travelled also with enormous velocity; and though at the distance of even the nearest planet, the apparent motion of the great wave, swift though it was in reality, would be so far reduced that it would have to be estimated rather than actually seen, yet there would be no difficulty in thus perceiving it with the mind's eye. The rate of motion indeed would almost be exactly the same as that of the equatorial part of the surface of Mars, in consequence of the planet's rotation; and this (as is well known to telescopists), though not discernible, directly produces, even in a few minutes, changes which a good eye can clearly recognise. We can scarcely doubt then that if our earth were so situated at any time when one of the great waves generated by Peruvian earthquakes is traversing the Pacific that the hemisphere containing this ocean were turned fully illuminated towards Venus (favorably placed for observing her), the disturbance of the Pacific could be observed and measured by telescopists on that planet.

Unfortunately there is little chance that terrestrial observers will ever be able to watch the progress of great waves athwart the oceans of Mars, and still less that any disturbance of the frame of Venus should become discernible to us by its effects. We can scarce even be assured that there are lands and seas on Venus, so far as direct observation is concerned, so unfavorably is she always placed for observation; and though we see Mars under much more favorable conditions, his seas are too small and would seem to be too shallow (compared with our own) for great waves to traverse them such as could be discerned from the earth.

Yet it may be well to remember the possibility that changes may at times take place in the nearer planets—the terrestrial planets as they are commonly called, Mars, Venus, and Mercury—such as telescopic observation under favorable conditions might detect. Telescopists have, indeed, described apparent changes, lasting only for a short time, in the appearance of one of these planets, Mars, which may fairly be attributed to disturbances affecting its surface in no greater degree than the great Peruvian earthquakes have affected for a time the surface of our earth. For instance, the American astronomer Mitchel says that on the night of July 12, 1845, the bright polar snows of Mars exhibited an appearance never noticed at any preceding or succeeding observation. In the very centre of the white surface appeared a dark spot, which retained its position during several hours. On the following evening not a trace of the spot could be seen. Again the same observer says that on the evening of August 30, 1845, he observed for the first time a small bright spot, nearly or quite round, projecting out of the lower side of the polar spot. "In the early part of the evening," he says, "the small bright spot seemed to be partly buried in the large one. After the lapse of an hour or more my attention was again directed to the planet, when I was astonished to find a manifest change in the position of the small bright spot. It had apparently separated from the large spot, and the edges alone of the two were now in contact, whereas when first seen they overlapped by an amount quite equal to one-third of the diameter of the small one. This, however, was merely an optical phenomenon, for on the next evening the spots went through the same apparent changes, as the planet went through the corresponding part of its rotation. But it showed the spots to be real ice masses. The strange part of the story is that in the course of a few days the smaller spot, which must have been a mass of snow and

ice as large as Nova Zembla, gradualfy disappeared." Probably some great shock had separated an enormous field of ice from the polar snows, and it had eventually been broken up and its fragments carried away from the arctic regions by currents in the Martian oceans. It appears to us that the study of our own earth, and of the changes and occasional convulsions which affect its surface, gives to the observation of such phenomena as we have just described a new interest. Or rather, perhaps, it is not too much to say that telescopic observations of the planets derive their only real interest from such considerations. —*Cornhill Magazine.*

LYRICS FROM HEINE.

BY THEODORE MARTIN.

"*Sie haben heut' Abend Gesellschaft.*"

THEY have company coming this evening,
And the house is ablaze with light;
Up yonder a figure in shadow
Sweeps past by the windows bright.

Thou seest me not,—in the darkness
I stand here, under thy room,—
Still less can'st thou see the darkness
Is shrouding my heart in gloom.

My dark heart loves thee, adores thee,
It loves, and it breaks for thee,—
Breaks, quivers, wells out its dear life-blood,—
But all this thou dost not see!

"*Die Jungfrau schläft in der Kammer.*"

THE girl is asleep in her chamber,
The moon looks quivering in;
Outside there is humming and strumming,
As of tunes when the waltzers spin.

"I'll look out of my window, and see who
Is disturbing my rest there below."
And there stands a skeleton fiddling,
And he sings, as he jerks his bow:

"Once you promised to dance as my partner—
You broke your word; and to-day
There's a ball going on in the churchyard,
We'll dance it out there—come away!"

The voice strikes home to the maiden,
It wiles her out at the door;
She follows, as, singing and fiddling,
The skeleton strides on before.

It fiddles, and skips, and cuts capers;
Clap, clap! go its bones; and its skull
Keeps gruesomely nodding and nodding,
In the eerie moonshine dull.

"*Am fernen Horizonte.*"

On the verge of the far horizon
Stands the town with steeple and tower,
And it looks like a shape of a cloud-land
In the dusk of the twilight hour.

A damp breeze ruffles the ash-grey
Lake, as long we steer;
The beat of the boatman's oar falls
Slow, like a dirge, and drear.

The sun flashes up for a moment,
Just one, ere it sinks below,
And shows me the spot where I lost her,
My darling one, years ago.

"*Das Herz ist mir bedrückt und sehnlich.*"

My heart is sad, with sore misgiving
I think of days of "auld lang syne;"
The world was pleasant then to live in,
And folks were neither fast nor fine.

But everything is out of gear now,
Such push and struggle, care and dread;
Of God on high we have no fear now,
And down below the devil's dead.

And things look crumbling all to ruin,
So bleak, so dismal; were it not
For here some billing, there some cooing,
What would there be to live for—what?

"*Undwüssten's die Blumen, die Kleinen.*"

If the little flowers knew how deep
Is the wound that is in my heart,
Their tears with mine they'd weep,
For a balm to ease its smart.

If the nightingales knew how ill
And worn with woe I be,
They would cheerily carol and trill,
And all to bring joy to me.

If they knew, every golden star,
The anguish that racks me here,
They would come from the heights afar
To speak to me words of cheer.

But none of them all can know;
One only can tell my pain,
And she has herself—oh woe!—
She has rent my heart in twain.

"*Die Jahre kommen und gehen.*"

YEARS come and go; generations
Are perishing day by day,
But the love that my heart aches with,
It never will pass away.

If once, but once, I might see thee,
And sink on my knees at thy feet,
And, dying there, dying might tell thee,
"I love thee, I love thee, sweet!"

Blackwood's Magazine.

BOOKS AND CRITICS.*

BY MARK PATTISON.

BEFORE advancing any statements which may appear to you doubtful, I will bespeak your favorable attention by saying something which cannot be contradicted.

A man should not talk about what he does not know. That is a proposition which must be granted me. I will go on to say further—it is not the same thing—a man should speak of what he knows. When it was proposed to me to say something to you this evening, I wished that what I said should be about something I knew.

I think I do know something about the *use* of books. Not the contents of books, but the value and use of them. All men have read some books. Many have read much. There are many men who have read more books than I have. Few in this busy, energetic island in which we live can say, what I have to confess of myself, that my whole life has been passed in handling books.

The books of which we are going to speak to-night are the books of our day—modern literature, or what are commonly called "new books."

So various are the contents of the many-colored volumes which solicit our attention month after month for at least nine months of the year, that it may seem an impossible thing to render any account of so many-sided a phenomenon in the short space of one lecture. But I am not proposing to pass in review book by book, or writer by writer—that would be endless. I am not proposing to you to speak of individuals at all, I want you to take a comprehensive point of view, to consider our books *en masse*, as a collective phenomenon—say from such a point of view as is indicated by the questions, "Who write them? Who read them? Why do they write or read them? What is the educational or social value of the labor so expended in reading or writing?

Literature is a commodity, and as such it is subject to economic law. Books, like any other commodity, can only be produced by the combination of labor and capital—the labor of the author, the capital of the publisher. They would not be written unless the author labored to write them. They could not be printed unless there was somebody ready to advance money for the paper and the work of the printing-press. The publisher, the capitalist, risks his money on a book because he expects to turn it over with a trade profit—say 12 per cent—on it. On the capitalist side the production is purely a commercial transaction; but on the labor side, *i.e.*, on the part of the author, it is not equally easy to state the case as one of labor motived by wages. Certainly authorship is a profession. There are authors, who are authors and nothing more—men who live by their pen, as a counsel lives by giving opinions, or a physician by prescribing for patients. But this is only partially the case with our literature. A large part of it is not paid for; the author's labor is not set in motion by wages. Many other motives come in, inducing men to address the public in print, besides the motive of wages. Disinterested enthusiasm; youthful ardor of conviction; egotism in some one of its many forms, of ambition, vanity, the desire to teach, to preach, to be listened to; mere

* A Lecture, delivered Oct. 29, 1877.

restlessness of temperament; even the having nothing else to do—these things will make a man write a book quite irrespective of being paid for doing so. Did you ever hear of Catherinot? No! Well Catherinot was a French antiquary of the seventeenth century; a very learned one, if learning means to have read many books without understanding. Catherinot printed, whether at his own cost or another's I can't say, a vast number of dissertations on matters of antiquity. David Clément, the curious bibliographer, has collected the titles of one hundred and eighty-two of those dissertations, and adds there were more of them which he had not been able to find. Nobody wanted these dissertations of Catherinot. He wrote them and printed them for his own gratification. As the public would not take his *paperasses*, as Valesius called them, he had recourse to a device to force a circulation for them. There was then no penny post, so he could not, like Herman Heinfetter, post his lucubrations to all likely addresses, but he used to go round the *quais* in Paris, where the old book-stalls are, and, while pretending to be looking over the books, slip some of his dissertations between the volumes of the *boutiquier*. In this way the one hundred and eighty-two or more have come down to us. Catherinot is a bye-word, the typical case of scribbleomania,—of the *insanabile scribendi cacoethes*—but the malady is not unknown to our time, and accounts for some of our many reams of print. And even if pure scribbleomania is not a common complaint, there are very many other motives to writing besides the avowed and legitimate motive of earning an income by the pen. Why do men make speeches to public meetings, or give lectures in public institutions? It is a great deal of trouble to do so. The motives of the labor are very various. Whatever they are the same variety of motives urges men to write books.

Notwithstanding these exceptions, the number and importance of which must not be lost sight of in our inquiry, the general rule will still hold that books being a commodity are subject to the same economic laws as all commodities. That one which is of importance for us is the law of demand and supply; the law which says that demand creates supply and prescribes its quantity and quality. You see at once how vital to literature must be the establishment of this commercial principle as its regulator, and how radical must have been the revolution in the relation between writer and reader which was brought about when it was established. In the times when the writer was the exponent of universally received first principles, what he said might be true or might be false, might be ill or well received, but at all events he delivered his message; he spoke as one having authority, and did not shape his thoughts so as to offer what should be acceptable to his auditory. Authorship was not a trade; books were not a commodity; demand did not dictate the quality of the article supplied. In England, at the beginning of the eighteenth century, the transformation of the writer from the prophet into the trading author was pretty well complete. As we trace back our civilisation to the cave man, so it is worth while casting a glance at the ancestral author-ape from whom is descended the accomplished and highly-paid leader-writer of 1877, who sits for a county, and the "honor of whose company" dukes solicit. The professional author of Queen Anne's time has been delineated to us, by the master-hand of Pope, as a disreputable being, starving in a garret "high in Drury-lane," on an occasional five guineas thrown to him by the grudging charity of one of the wealthy publishers, Tonson or Lintot, or more likely Curll, "turning a Persian tale for half-a-crown," that he might not go to bed supperless and swearing. He was a brainless dunce without education, a sneaking scoundrel without a conscience. But you will notice that in this his mean estate, now become a hireling scribbler, he continued for long to keep up the fiction that the author was a gentleman who wrote because it pleased him so to do. When he had finished his pamphlet in defence of the present administration, a pamphlet for which he was to get Sir Robert's shabby pay, he pretended, in his preface, that he had taken up his pen for the amusement of his leisure hours. When he had turned into rhyme Ovid's De Arte Amandi for Curll's Chaste Press, he said he was going to oblige the town with a poetical trifle. You all remember Pope's couplet—

"Rhymes ere he wakes, and prints before term ends.
Obliged by hunger and request of friends."

The second line ought to be read thus—

"Obliged by hunger and—request of friends,"

hunger being the real cause of the hurried publication; "request of friends" the cause assigned, suppose on the title-page. The transformation of the teacher into the paid author was complete; but the professional author, though compelled to supply the article which was in demand, still gave himself the airs of an independent gentleman, and affected to be controlling taste instead of ministering to it.

In our own day, notwithstanding the exceptions to which I have alluded, it is now the rule that the character of general literature is determined by the taste of the reading public. It is true that any man may write what he likes, and may print it. But if he cannot get the public to buy it, his book can hardly be said to be published. At any rate, books that are not read count for nothing in that literature of the day which is the subject before us.

Let us first inquire what literature is as to its mass, before we look into its composition. And here it will simplify our subject if we divide books into two classes—literature strictly so called, and the books which are not literature.

Literature does *not* mean all printed matter. Blue-books and Acts of Parliament, Mrs. Beeton's Household Management, Timbs's Year-book of Facts, Fresenius's Chemical Analysis—these are not literature. The word is not applicable to all the books in our libraries. Most books are didactic—*i.e.* they are intended to convey information on special subjects. Treatises on agriculture, astronomy, a dictionary of commerce, are not literary works. They are books—useful, necessary for those who are studying agriculture, astronomy, commerce—but they do not come under the head of literature. There are books which the publishers are pleased to advertise as "gift-books," the object of whose existence is that they may be "given"—no doubt they answer their purpose, they are "given"—and there is an end of them. I have seen an American advertising column headed "swift-selling books," the object of which books, I presume, was that they might be "sold," like Peter Pindar's razors. When we have excluded all books which teach special subjects, all gift-books, all swift-selling books, all religious books, history and politics, those which remain are "literature."

I am unable to give a definition of literature. I have not met with a satisfactory one. Mr. Stopford Brooke, in a little book which I can cordially recommend to beginners—it is called A Primer of English Literature—has felt this difficulty at the outset. He says in his first page, "By literature we mean the written thoughts and feelings of intelligent men and women arranged in a way which will give pleasure to the reader." It would be easy to show the defects of this definition; but, till I am prepared to propose a better, we may let this pass. Of what books the class literature consists may be better understood by setting the class in opposition to special books than by a description. Catalogues of classified libraries use the term "belles lettres" for this class of book.

When we have thus reduced the comprehension of the term "literature" to its narrowest limits, the mass of reading soliciting our notice is still enormous—overwhelming. First come the periodicals, and of periodicals first the dailies. The daily newspaper is political or commercial, mainly; but even the daily paper now, which pretends to any standing, must have its column of literature. The weekly papers are literary in a large proportion to their bulk. Our old friend the *Saturday Review* is literary as to a full half of its contents, and, having worked off the froth and frivolity of its froward youth, offers you for sixpence a co-operative store of literary opinion of a highly instructive character, and always worth attention. There are the exclusively literary weeklies—the *Academy*, the *Athenæum*, the *Literary World*—all necessary to be looked at as being integral parts of current opinion. We come to the monthlies. It is characteristic of the eager haste of our modern Athenians to hear "some new thing," that we cannot now wait for quarter-day. Those venerable old wooden three-deckers, the *Edinburgh Review* and the *Quarterly Review*, still put out to sea under the

command, I believe, of the Ancient Mariner, but the active warfare of opinion is conducted by the three new iron monitors, the *Fortnightly*, the *Contemporary*, and the *Nineteenth Century*. In these monthlies the best writers of the day vie with each other in soliciting our jaded appetites on every conceivable subject. Indeed, the monthly periodical seems destined to supersede books altogether. Books now are largely made up of republished review articles. Even when this is not the case, the substance of the ideas expanded in the octavo volume will generally be found to have been first put out in the magazine article of thirty pages. Hence the monthlies cannot be disposed of by slightly looking into them; they form at this moment the most characteristic and pithy part of our literary produce. It has been calculated that the insect life upon our globe, if piled in one mass, would exceed in magnitude the heap which would be made by bringing together all the beasts and birds. For though each insect be individually minute, their collective number is enormous. So a single number of a periodical seems little compared with a book; but then there are so many of them, and they are reproduced so fast! A newspaper seems less than it is on account of the spread of the sheet. One number of the *Times*, a double sheet containing 16 pages, or 96 columns, contains a quantity of printing equal to 384 pages 8vo, or an average-sized 8vo volume. Even a hard reader might find it difficult within thirty days to overtake the periodical output of the month; and then on the first he would have to begin all over again.

So much for periodicals; we come now to the books.

The total number of new books, not including new editions and reprints, published in Great Britain in 1876, was 2,920. In accordance with the construction I have put on the term literature, we must subtract from this total all religious, political, legal, commercial, medical, juvenile books, and all pamphlets. There will remain somewhere about 1,620 books of literature, taking the word in its widest extent. I may say, by the way, that these figures can only be regarded as approximative. Cataloguing in this country is disgracefully careless. Many books published are every year omitted from the London catalogue. For example, out of 267 works published in the two counties of Lancashire and Cheshire, only 31 are found entered in the last London catalogue. But I will take no account of omissions. I will even strike off the odd 120 from my total of 1,620, and say that English literature grows only at the rate of 1,500 works per annum. At this rate in ten years our literary product amounts to 15,000 books. Put the duration of a man's reading life at forty years. If he had to read everything that came out, to keep pace with the teeming press, he would have had in his forty years 60,000 works of contemporary literature to wade through. This in books only, over and above his periodical work, which we calculated would require pretty well all his time.

But as yet we have got only Great Britain. But England is not all the world, as Mr. Matthew Arnold reminds us (Essays, p. 43). By the very nature of things, much of the best that is known and thought in the world cannot be of English growth, must be foreign; in a survey of literature we cannot afford to ignore what is being said and written in the countries near us, any more than in politics we can afford to ignore what is being done by them. At present Germany and France are the two countries with whom we are most closely connected, and whose sayings are the most influential sayings in the world.

Germany is the country of books, and its output of books is enormous. The average annual number of books printed in that language is about 12,000. However, only a fraction of this total of German books deserves to rank as literature. Mere book-making is carried in Germany to a frightful pitch. The bad tobacco and the falsified wines of Mayence and Hamburg find their counterpart in the book wares of Leipsic. The German language is one of the most powerful instruments for the expression of thought and feeling to which human invention has ever given birth. The average German literary style of the present day is a barbarous jargon, wrapping up an attenuated and cloudy sense in bales of high-sounding words. The fatigue which this style of utterance inflicts upon the mind

is as great as that which their Gothic letter, a relic of the fifteenth century, inflicts upon the eye, blackening and smearing all the page. An examination of the boys in the Johannenen of Hamburg elicited the fact that sixty-one per cent. of the upper class were short-sighted. A large part of German books is not significant of anything—mere sound without meaning.

Putting aside, however, the meaningless, there remains not a little in German publication which requires the attention of one who makes it his business to know the thoughts of his age. The residuum of these 12,000 annual volumes has to be sifted out of the lumber of the bookshops, for it embodies the thoughts and the moral ideal of a great country and a great people. Poor as Germany is in literature, it is rich in *learning*. As compilers of dictionaries, as accumulators of facts, the German bookmaker is unrivalled. The Germans are the hewers of wood and drawers of water for a literature which they have not got. All the rest of the European nations put together do not do so much for the illustration of the Greek and Latin classics as the Germans alone do—classics by whose form and spirit they have proted so little. It is one of the paradoxes of literary history that in this very country—Germany—which is the world's schoolmaster in learning the Greek and Latin languages, so little of the style and beauty of those immortal models passes into its daily literature.

If style and form alone were what gave value to literature, the first literature now produced in the world would be the French. All that the Germans have not the French have. Form, method, measure, proportion, classical elegance, refinement, the cultivated taste, the stamp of good society—these traits belong not only to the first class of French books but even to their second and third rate books. No writer in France of whatever calibre can hope for acceptance who violates good taste or is ignorant of polite address. German literature is not written by gentlemen—mind, I speak of literature, not of works of erudition—but by a touzle-headed, unkempt, unwashed professional bookmaker, ignorant alike of manners and the world. In France a writer cannot gain a hearing unless he stands upon the platform of the man of the world, who lives in society, and accepts its prescription before he undertakes to instruct it. French books are written by men of the world for the world. This is the merit of the French. The weak point of French books is their deficiency of fact, their emptiness of information. The self-complacent ignorance of the French writer is astonishing. Their books are too often style and nothing more. The French language has been wrought up to be the perfect vehicle of wit and wisdom—the wisdom of the serpent—the incisive medium of the practical intelligence. But the French mind has polished the French language to this perfection at a great cost—at the cost of total ignorance of all that is not written in French. Few educated Frenchmen know any language but their own. They travel little, and, when they do travel, their ignorance of the speech of the country cuts them off from getting to know what the people are like. We must credit the French with knowing their own affairs; of the affairs even of their nearest neighbors in Europe they are as ignorant as a Chinese. Their newspapers are dependent for their foreign intelligence on the telegrams of the *Times*. Hence their foreign policy has been a series of blunders. Had the merits of the case been known to it, could Republican France, in 1849, have sent out an expedition to Rome to set up again the miserable ecclesiastical government which the Romans had thrown off? I was reading in the *Figaro* not long ago a paragraph giving an account of the visit of a French gentleman in England. On some occasion he had to make a speech; and he made it in English, acquitting himself very creditably. "M. Blanc," says the *Figaro*, "being a Breton, spoke English like a native Englishman, on account of the close affinity between the two languages, Breton and English." The *Figaro* is one of the most widely circulated newspapers in France. England is a country with which the French are in close and constant communication, and yet they have not discovered that the English tongue does not belong to the Keltic family of languages. That Germany is as little known to them as England I might instance in the most

popular tourist's book of the day. Victor Tissot's "Voyage aux pays des Milliards" has reached something approaching to fifty editions. It is nothing but a tissue of epigrams and witty exaggerations, a farce disguised as fact, and taken by the French nation as a serious description of German life.

It is an error to say, as is sometimes said, that French literature is a mere literature of style. This finished expression embalms much worldly wisdom, the life experience of the most social of modern men and women; but it is an experience whose horizon is limited by the limits of France. It is a strictly national literature. It is, in this respect, the counterpart of the literature of ancient Athens. *We*, all the rest of us, are to the Frenchman barbarians in our speech and manners. He will not trouble himself about us. By this exclusiveness he gains something and loses much. He preserves the purity of his style. The clearness of his vision and the precision of his judgment, from his national point of view, are unimpaired. He loses the cosmopolitan breadth—the comparative standpoint. But the comparative standpoint is the great conquest of our century, which has revolutionized history and created social science and the science of language.

He who aims at comprehending modern literature must keep himself well acquainted with the contemporary course of French and German books, as well as of his own language; and these two are enough. A Spanish literature of to-day can hardly be said to exist, and the Italians are too much occupied at present in reproduction and imitation to have much that is original to contribute to the general stock of Europe.

English, French, German: the periodical and the volume publication in these three languages, year by year: you will say the quantity is prodigious—overwhelming, if it were to be supposed that any reader must read it all. But this is not the case: what the publisher's table offers is a choice—something for all tastes: one reads one book, another another. As I divided books into two classes, books of special information and books of general literature, so readers must now be divided into two classes—the general public and the professional literary man: the author, or critic, let us call him. I am not proposing that the general public should read, or look at, all this mass of current literature. It would be preposterous to think of it. You must read by selection; but four your selection you will be guided—you are so in fact—by the opinion of those whom I must now speak of as a class, by the name of critics.

Criticism is a profession, and, as you will have gathered from what has been said, an arduous profession; the responsibility great, the labor heavy. Literature is not your profession—I speak to you as the general public—it is at most a solace of your leisure hours; but the critic, he who sits on the judgment-seat of letters, and has to acquit or condemn, to examine how each writer has executed his task, to guide the reading community by distinguishing the good and censuring the bad—he really holds an educational office which is above that of any professor or doctor, inasmuch as the doctor of laws or of divinity is authorised to speak to his own faculty, whereas the critic speaks to the whole republic of letters. What is recreation to you is business to the critic, and his business is to keep himself acquainted with the course of publication in at least these three languages. Looking, then, at the mass and volume of printed matter to be thus daily and hourly sifted, you cannot think that the profession of critic is a sinecure.

And before he can be qualified to take his seat on the bench and dispense the law, consider what a lengthened course of professional training must have been gone through by our critic or judicial reader. When he has once entered upon his functions, his whole time will be consumed, and his powers of attention strained to the utmost, in the effort to keep abreast of that contemporary literature which he is to watch and report upon. But no one can have any pretension to judge of the literature of the day who has not had a thorough training in the literature of the past. The critic must have been apprenticed to his profession.

It has been calculated that in a very advanced and ramified science, *e.g.* chemistry, fourteen years are required by the student to overtake knowledge

as it now stands. That is to say, that to learn what is known before you can proceed to institute new experiments, fourteen years are necessary—twice the time which the old law exacted of an apprentice bound to any trade. The 5th of Elizabeth, which used to be known as the statute of apprenticeship, enacted that no person should for the future exercise any trade, craft, or mystery, unless he had previously served to it an apprenticeship of seven years at least. This enactment of 1563 was but the legislative sanction of what had been for centuries the bye-law of the trade guilds. This bye-law had ruled, not in England only, but over all the civilised countries of Europe. It was a bye-law that had not been confined to trades. It had extended over the arts and over the liberal professions. University degrees are nothing more than the application of this bye-law to the learned professions. It required study for twenty-eight academical terms, *i.e.*, seven years, to qualify for the degree of M.A. in the universities. Rather, I would say, that the line was not then drawn between the mechanical and the liberal branches of human endeavor; both were alike designated "Arts;" and the term "universitas," now restricted to the bodies which profess theoretical science, was then the common appellation of all corporations and trade guilds, as well as the so-called universities of Paris and Bologna.

Regarding literature as a separate art we might ask, How long would it require to go through the whole of it to become a master of this art? Even taking the narrowest definition of literature, it seems a vast surface to travel over, from Homer down to our own day! I say the surface, because no one supposes it necessary to read every line of every book which can call itself literature. Remember that in studying the literature of the past, other countries than France and Germany come in. I have dispensed our critic from occupying himself with the Italian and Spanish books of to-day. But with the books of the past it is different. Italy, in the fifteenth and sixteenth centuries, was the most civilised and literary country in Europe. And Spain has its classical writers. Their mere mass is prodigious. Life in Italy was rich and varied, and consequently so were the materials for that true narrative which is stranger than fiction. Villari has computed that the Italian republics of the Middle Ages enjoyed a total of 7,200 revolutions, and recreated themselves with 700 grand massacres. The longest single poem, I believe, extant, is an Italian poem, the Adone of Marini, who lived in the time of our James I. It contains 45,000 lines. As for Spain, one single author of the seventeenth century, Lopes de Vega, wrote 1,800 plays; his works altogether fill forty-seven quarto volumes. Alonso Tostado, a Spanish bishop of the fifteenth century, wrote nearly forty folios, having covered with print three times as many leaves as he had lived days. To come to England. Our William Prynne wrote 200 different works. Chalmers's collected edition of the English poets only comes down to Cowper, who died in 1800, and it fills twenty-one volumes royal 8vo, double columns, small type. The volumes average 700 pages. This gives a total of 14,700 pages, or 29,400 columns. Now it takes—I have made the experiment—four minutes to read a column with fair attention. Here is a good year's work in reading over, only once, a selection from the English poets. The amount of reading which a student can get through in a given time hardly admits of being measured by the ell. The rate of reading varies with the subject, the rapid glance with which we skim the columns of a newspaper being at one end of the scale, and the slow sap which is required for a page of, say, Kant's Critique of Pure Reason being at the other. Still, just to get something to go upon, make a calculation in this way: Suppose a man to be able to read eight hours a day. No one can really sustain receptive or critical attention to written matter for eight hours. But take eight hours as the outside possibility. Thirty pages 8vo is an average hour's read, taking one book with another. This would make 240 pages per day, 1,680 per week, and 87,360 pages in the year. Taking the average thickness of an 8vo volume as 400 pages only, the quantity of reading which a diligent student can get over in a year is no more than an amount equal to about 220 volumes 8vo. Of course this is a merely mechanical computation, by which we cannot pre-

tend to gauge mental processes. But it may be worth while knowing that the merely mechanical limit of study is some 220 volumes 8vo per annum.

It would be clearly impossible, even for an industrious reader to read, even once, every line of the world's stock of poetry, much less every line of all that can be called literature. In no branch of study is mere mechanical application of much avail. In the study of literature, as in art, mechanical attention, the mere perusal of the printed page, is wholly useless. The student, therefore, has to overcome the brute mass of the material on which he works by artificial expedients. Of these expedients the most helpful is that of selection. As he cannot look into every book, he must select the best. And selection must not be arbitrary. In the literary creations of the ideal world, as in the living organisms of the material world, natural selection has saved us the difficulty of choice. The best books are already found and determined for us by the verdict of time. Life of books is as life of nations. In the battle for existence the best survive, the weaker sink below the surface, and are heard of no more. In each generation since the invention of printing many thousand works have issued from the press. Out of all this mass of print a few hundred are read by the generation which succeeds; at the end of the century a score or so may be still in vogue. Every language has its classics, and it is by this process of natural selection that the classics of any given country are distinguished from the weltering mass of abandoned books.

It is a great assistance to the student that the classics of each language are already found for him by the hand of time. But our accomplished critic cannot confine his reading to the classics in each language; his education is not complete till he has in his mind a conception of the successive phases of thought and feeling from the beginning of letters. Though he need not read every book, he must have surveyed literature in its totality. Partial knowledge of literature is no knowledge. It is only by the comparative method that a founded judgment can be reached. And the comparative method implies a complete survey of the phenomena. It is recorded of Auguste Comte that after he had acquired what he considered a sufficient stock of material, he abstained scrupulously from all reading, except two or three poets (of whom one was Dante) and the Imitatio Christi of Thomas à Kempis. This abstinence from reading Comte called his "hygiène cérébrale," healthy treatment of his brain. The citizens of his Utopia are to be prohibited from reading any books but those which had happened to fall in Comte's way before he gave up reading. It is, I think, the case that our student has now to read more than is compatible with perfect equilibrium of faculty. On the other hand, the consequences of cutting off contact with the thoughts of others, as Comte resolutely did, may be seen in the unhealthy egotism and puerile self-complacency which deform his writings, his perpetual 'mistake as to tl relative value of his own things and the things of others.' (Arnold's Essays.)

We require of our thoroughly furnished critic that he should have prepared himself for his profession by a comprehensive study of all that human thought, experience, and imagination have stored up for us. When we have used all the short cuts to this goal which art and nature have provided, how many years will such an apprenticeship require? The data are wanting on which to found a calculation. Can the work be got through in seven years, in twice seven, or in three times seven? I do not know. Archbishop Usher at twenty began to read the Fathers, Greek and Latin, with the resolution of reading them through. The task was achieved in nineteen years. Hammond, at Oxford, read thirteen hours a day (Life of Usher. Life of Hammond, by Fell). Milton's 'industrious and select reading,' in preparation for the great work to which he dedicated a whole life, long choosing, and late beginning, are as well-known, as the thirty years spent by Edward Gibbon in preparing for and in composing his history.

Of course in this, as in other trades, a man learns while he practises. Buffon told a friend that, after passing fifty years at his desk, he was every day learning to write. The critic's judgment matures by many failures. Without these three elements—time, industry, arduous endeavor—no man can attain to

be a supreme judge of literary worth. Perhaps you have been accustomed to set before yourselves quite another ideal of the literary life. You have thought the business of reviewing a lazy profession, the resource of men who wanted industry or talent, who were, in short, fit for nothing better, a profession largely adopted by briefless barristers, by incompetent clerks, by green youths fresh from college examinations, and generally by men who shirk hard work—in fact an easy-chair and slipper business. You have, perhaps, supposed that anybody can write a review, that essay writing is as easy as talking, that it is only a matter of cheek and fluency. You have imagined that a quarterly or a weekly reviewer merely got his knowledge of the subject in hand out of the book he had under review; that he, thereupon, dishonestly assumes to have known all about it, and with voluble impertinence goes on to retail this newly acquired information as if it were his own, seasoning it with sneers and sarcasms at the author from whom he is stealing. I know these things are said. I have heard even respectable reviews and magazines accused of paying for this sort of thing by the column, *i.e.* giving a pecuniary inducement to fill out paper with words—to make copy, or padding, as it is called. I don't know if these things are done in practice. If they are, they are fraudulent, and must, I should think, come within the act against adulteration. What I have set before you in the above outline is the honest critic who gives to his calling the devotion of a life, prepares himself by antecedent study, and continues through the whole of his career to make daily new acquisitions and to cultivate his susceptibility to new impressions.

Such are the qualifications of the teacher, of the writer of books. I turn now from the author to the reader, from the producer to the consumer. You to whom I now speak are a portion of the public; you represent the consumer. And first, what is the mechanism by which the consumer is provided with his article? The English are not a book-storing people. Each family has not, as a rule, its own library. In great country houses, it is true, there is always the library. Many treasures are in these old repositories—the accumulated store of half-a-dozen generations. They often go back to Queen Anne, the great book-diffusing period of our annals; sometimes, but more rarely, to the seventeenth century. The family history may be read in the successive strata, superimposed, like geological strata, one on the other. The learned literature of the seventeenth century, largely composed in Latin, its Elzevirs, and its Variorum classics, will often be found relegated to a garret. These books have come to be regarded as lumber. They are only not cleared out and dispatched to Sotheby's, because the cost of removal would exceed their produce at the auction. This, though hoisted up to the garret by an upheaval, is in point of time the earliest stratum. Upon this will be found a bed of theological pamphlets mostly in small quarto, in which lurk the ashes of passion, once fired by the revolution of 1688, the non-juring pamphlets, the Dr. Sacheverell pamphlets, the Bangorian controversy. In the great library on the ground-floor we shall find the earliest stratum to consist of the splendid quartos, on thick paper with wide margin, of Queen Anne's time. The *Spectator*, the *Tattler*, Pope's Homer, a subscription copy; the folios of Carte and Echard, and so down the century over Junius and Chesterfield's Letters to the first editions of Sir Walter Scott's poems. The mere titles of such a collection, or accretion, form a history of literature. But it is only in our old country houses that such a treat is to be enjoyed, and the number of these diminishes in each generation. Cultivation and intellectual tastes seem to be dying out among the English aristocracy. It has been said the fop of Charles II.'s time at least affected to be a wit and a scholar, the fop of our times aims at being a fool and a dunce.

In the house of a middle-class family you will also find a few books—chiefly religious books or specialty books—little literature, and that casual, showing no selection, no acquaintance with the movement of letters. There will be nothing that can be called a library. The intellectual barrenness of these middle-class homes is appalling. The dearth of books is only the outward and visible sign of the mental torpor which reigns in those destitute regions. Even

in priest-ridden France, where the confessor has all the women and half the men under his thumb, there is more of that cultivation which desiderates the possession of books. In many a French family of no great means is a bookcase of some five hundred volumes, not presents, but chosen, and in which the *chefs-d'œuvre* of French literature will be included. They will be in half-morocco, with gilt edges; binding not sumptuous, but elegant, and perfectly clean, neither thumbed nor grease-stained, nor gas-shrivelled—a sign, you will say, that they are not much used. Not so. A Frenchman cannot endure a dirty book. It is an error to suppose that the dirt on the cover and pages of a book is a sign of its studious employment. Those who use books to most purpose handle them with loving care. The dirt on English books is a sign of neglect, not of work. It is disrespectful and ignorant handling. If you have a select cabinet of books, with which you live habitually as friends and companions, you would not choose to have them repulsive in dress and outward appearance.

How insignificant an item of household expenditure is the book-seller's bill in a middle-class family! A man who is making £1,000 a year will not think of spending £1 per week on books. If you descend to a lower grade of income, the purchase of a book at all is an exceptional occurrence, and then it will rarely be a book of pure literature. The total population of the United Kingdom is more than thirty-three millions. The aggregate wealth of this population is manifold more than it was one hundred and fifty years ago, but the circle of book-buyers, of the lovers of literature, is certainly not larger, if it be not absolutely smaller.

One reason which may be assigned for the book dearth among families of small means is want of space. Room in this country is now become very costly. A family of £1,000 a year in a town probably pays out £100 a year as rent. A heavy tax! And what do you get for it? A hutch in which you can scarce put up your family or breathe yourself. You have literally no room for books. This, I grant, is a too true description of the town dwelling. But it is not altogether an account of why you are without a library. A set of shelves, thirteen feet by ten feet, and six inches deep, placed against a wall, will accommodate near one thousand volumes 8vo. Cheap as books now are, a well-selected library of English classics could be compressed into less room than this, was the companionship of books felt by you to be among the necessaries of life.

If narrow income and cramped premises will not let us have a private library, we may meet our wants in some measure by public libraries. The co-operative store as applied to groceries is a discovery of our generation. But the principle of co-operation was applied to libraries long before. The book-club is an old institution which flourished in the last century, but is nearly extinct now. There were some twelve hundred of these clubs scattered over England, and their disappearance has had a marked effect on the character of our book-market. Each country club naturally fell under the control of the one or two best-informed men of the neighborhood. The books ordered were thus of a superior class, and publishers could venture upon publishing such books because they knew they could look to the country clubs to absorb one edition. Now the supply of new books has passed away from the local clubs, and into the hands of two great central houses. Smith and Mudie, of course, look only to what is most asked for. And as even among readers the ignorant, the indolent, and the vulgar are in a large majority, it is the ignorant, the indolent, and the vulgar who now create that demand which the publisher has to meet. Universal suffrage in the choice of books has taken the place of a number of independent centres which the aristocracy of intellect could influence.

It may prove some compensation for the destruction of the country book-clubs, that the great towns are beginning to bestir themselves to look after their book supply. The earliest common libraries were, as we should expect, in universities and colleges, often remote from populous centres, such as the Sharp library in Bamburgh Castle. It is only quite recently that the trading and manufacturing towns have begun to feel the want of books. And the desire is stil

feeble, and has spread but a little way. Some eighty or ninety cities and towns, I believe, in all Great Britain, have adopted, in whole or in part, Mr. Ewart's Act. There is still a very large number of towns with a population over three thousand who have not yet felt the want of a public library. Your city, always forward where enterprise can go, and where educational matters are in question, stands first, or only second to Manchester in apprehending the public importance of a complete outfit of books.

So much on the book supply. I go on to the question, What is the stimulus which makes men ask for books? Why do English men and women of the present day read?

There are people, I believe, who read books that they may be able to talk about them. Reading from *any* motive is better than satisfied ignorance, but surely *this* motive is both morally and intellectually unsound Morally, it is an ostentation, an affectation of an interest you do not feel. Intellectually it is on a par with cram; it is no more knowledge than what is got up for the purpose of an examination is knowledge. What is read for the sake of reproducing in talk has neither gone to the head nor the heart. When any one says to me in company, "Have you read so-and-so?" I always feel an inclination to answer, "No, I never read anything," for I know the next question will be, "Did you like it?" and there an end. Those who most read books don't want to talk about them. The conversation of the man who reads to any purpose will be flavored by his reading; but it will not be about his reading. The people who read in order to talk about it, are people who read the books of the season because they are the fashion—books which come in with the season and go out with it. "When a new book comes out I read an old one," said the poet Rogers. And Lord Dudley—the great Lord Dudley, not the present possessor of the title—writes to the Bishop of Llandaff: "I read new publications unwillingly. In literature I am fond of confining myself to the best company, which consists chiefly of my old acquaintance with whom I am desirous of becoming more intimate. I suspect that nine times out of ten it is more profitable, if not more agreeable, to read an old book over again than to read a new one for the first time. . . . Is it not better to try to elevate and endow one's mind by the constant study and contemplation of the great models, than merely to know of one's own knowledge that such a book a'nt worth reading?" —(*Lord Dudley's Letters.*) We wear clothes of a particular cut because other people are wearing them. That is so. For to differ markedly in dress and behavior from other people is a sign of a desire to attract attention to yourself, and is bad taste. Dress is social, but intellect is individual: it has special wants at special moments. The tendency of education through books is to sharpen individuality, and to cultivate independence of mind, to make a man cease to be "the contented servant of the things that perish."

Dr. Halley used to recommend reading on medical grounds. He said close study prolonged life by keeping a man out of harm's way. But I never met with any one who acted upon Dr. Halley's advice, and chose to read hard that he might live long. And is there not truth in the opposite doctrine, which Mortimer Collins (Secret of Long Life, p. 136) inculcates, that "the laziest men live longest"?

I have not, remember, raised the question, Why *should* we read? This is the most important question of all those which can be raised about books. But I am not to-night presuming to advise you as to what you *should* do. I am only observing our ways with books—recording facts, not exhorting to repentance. Why *do* men read? What is the motive power which causes the flow of that constant supply of new books which flows over at those literary drinking-fountains, Smith's book-stalls?

Making exception of the specialty books—those which we get in order to learn some special subject—there is one, and one only, motive of all this reading—the desire of entertainment. Books are in our day the resource of our leisure; we turn to them in default of better amusement. Of course you will think immediately of the many exceptions which there are to this general statement. But, as I said before, the character of the books offered in the book-market is determined by the nature of

the *general* demand. And it is the character of the general literature of the day which fixes our attention at this moment.

In taking the Smith and Mudie counter as the standard of the literature consumed by the English public, I do so because the class of book they supply is the best average class of book going—of "new book." I do not forget how small a fraction after all of the thirty-four millions of Britons the consumers of books of this class are. We sometimes speak of the readers of this class of book as "the reading public." But I do not forget that there exists a wider "reading public," which is below the Smith and Mudie level. Enter a book-shop in a small town in a remote province, and you will find on its counter and shelves a class of literature of a grade so mean that a Smith's book-stall instantly rises fifty per cent. in your imagination. Ask for Thackeray's Vanity Fair. The well-dressed young person who attends to the shop never heard of Thackeray. The few books she can offer are mostly children's books,—grown people don't seem to read in country places—or they are books of a denominational cast, books which perhaps are called religious, but which are, strictly speaking, about nothing at all, and made up of strings of conventional phraseology. Some of these books, unknown as they are to the reviews, have a circulation which far surpasses anything ever reached by one of our "new books" which has been ushered into the world by complimentary notices in all the papers. In estimating the intellectual pabulum most relished by my countrymen, I do not forget that Zadkiel's Almanac had a circulation of 200,000. Commander Morrison, R.N., who only died as lately as 1874, was perhaps the most successful author of the day, and a great authority on astrology. He wrote, among other books, one entitled "The Solar System as it is, and not as it is represented by the Newtonians." He brought an action against Sir Edward Belcher, who had called him in print an impostor. It was tried before Chief Justice Cockburn, and Commander Morrison, who retained Serjeant Ballantine, obtained damages. The Court of Queen's Bench decided that Zadkiel was not an impostor. The tastes of this widest circle of readers—the 200,000 *abonnés* of Zadkiel—are not now under our consideration. We are speaking of the "reading public" in the narrower sense, and of what are called new books. And I was saying that this public reads for amusement, and that this fact decides the character of the books which are written for us.

As amusement I do not think reading can rank very high. When the brain has been strained by some hours' attention to business some form of open-air recreation is what would be hygienically best for it. An interesting game which can be played in the fresh air is the healthiest restorative of the jaded senses. It is a national misfortune that as our great towns have grown up in England there has been no reserve of ground in the public interest. The rich have their fox-hunting and their shooting, their deer-forests and their salmon-rivers. But these are only for the wealthy. Besides, they are pastimes turned into pursuits. What is wanted, in the interest of the humbler classes, is public places of considerable extent, easily accessible, where recreation for an hour or two can be always at hand. After manual labor rest and a book, after desk-work active exercise and a game, are what nature and reason prescribe. As every village should have its village green, so every town should have its one or more recreation grounds, where cricket, fives, tennis, croquet, bowls, can be got at a moment's notice in a wholesome atmosphere, not impregnated by gas, not poisoned by chemical fumes. Our towns are sadly behind in the supply of pleasant places of public resort. The co-operative principle has yet to be applied to open-air amusements. It is surely bad economy of life that in one of our wealth-producing centres a game of fives should be almost as difficult to get as a salmon-river.

Still, even if these things were to be had, instead of being as they are unprocurable, in the long winter of our northern climate there are many months in the year during which our amusement must be sought indoors. Here come in the social amusements — theatres, concerts, dances, dinners, and the varied forms of social gathering.

It is when all these fail us, and because they do so often fail us, that we

have recourse to the final resource of all —reading. Of indoor entertainment the truest and most human is that of conversation. But this social amusement is not, in all circumstances, to be got, and when it is to be had we are not always fit for it. The art of conversation is so little cultivated among us, the tongue is so little refined, the play of wit and the flow of fancy so little encouraged or esteemed, that our social gatherings are terribly stupid and wearisome. Count Pozzo di Borgo, miserable amid the luxurious appliances of an English country house—it is Lord Houghton tells the story (*Monographs*, p. 212) — "drew some newly arrived foreigner into a corner with the eager request, '*Viens donc causer, je n'ai pas causé pour quinze jours.*' Neither our language nor our temperament favors that sympathetic intercourse, where the feature and the gesture are as active as the voice, and in which the pleasure does not so much consist in the thing communicated as in the act of communication, and still less are we inclined to cultivate that true art of conversation, that rapid counterplay and vivid exercise of combined intelligences, which presupposes long and due preparation of the imagination and the intellect."

Instead of stimulating, we bore each other to the death. It is that we may escape from the terrible ennui of society that we have recourse to a book. We go to read not from craving for excitement, but as a refuge from the *tædium vitæ*, the irksomeness of herding with uninteresting fellow mortals. The man who is engaged all the morning and has his faculties stimulated, his intellect edged to keenness by the details of business, cannot, on his return to his fireside, subside into vacuity. He must have something to whittle at. He reads his newspaper as long as he can, and when the newspaper at last gives out, he falls back upon a book. The native of a southern climate who has no business, and whose mind is never roused to exertion, has no such craving. The Italian noble does without books. He passes his day in listless indolence, content without ideas. There is no vacuity and therefore no supply of books to fill it.

Here is the key to the character of the literature of our age. Books are a response to a demand. And the demand is a demand for recreation by minds roused to intelligence but not to intellectual activity. The mind of the English reader is not, as in the southern man, torpid, non-existent; it is alive and restless. But it is not animated by a curiosity to inquire, it is not awake to the charm of ideas, it is only passively recipient of images. An idea is an excitant, comes from mind, and calls forth mind. An image is a sedative.

The books, then, which are produced have to meet this mental condition of the reader. They have to occupy his attention without making any call upon his vigilance. There must be no reflex mental action. Meditation is pain. Fresh images must flow as a continuous douche of tepid water over the mind of the reader, which must remain pleased but passive. Books must be so contrived as to produce and sustain this beatific self-forgetfulness. That is called by publishers a successful book which just hits this mental level. To express all I have tried to say in one epithet—a book must be readable. If a book has this quality it does not much matter what it is about. Any subject will answer the purpose if the treatment be agreeable. The book must be so written that it can be read without any force being put upon the attention. It must not require thought or memory. Nor must there be any learned rubbish about. A Latin quotation may be ventured only by an established favorite. Ouida did once hazard "facilis descensus Avernus;" but it was ill-taken by the critics.

Under these conditions of the public demand, it is not surprising that the species of composition which is most in favor should be prose fiction. In every other style of literary art, prose or poetical, our age looks back to bygone ages for models which it is ever endeavoring to approach, but dare not hope to surpass. In the novel, our age, but especially our own country, may justly boast to have attained a development of inventive power unequalled in the annals of all literature. It is not only that this is the most prolific species of book, more than one novel per working day being given to the world every year, but it is that the most accomplished talent which is at work for the book-market is devoted

to this class of production. If, as I laid down at the commencement of this lecture, supply is governed by demand, it is clear that this result must be so. Entertainment without mental effort being our requirement, we must have our politics, our history, our travels presented in an entertaining way. But fiction, if taken from every-day life, and not calling upon us for that effort of imagination which is necessary to enable us to realise a past age, is entertainment pure, without admixture of mental strain or hitch of any kind.

For our modern reader it is as necessary that the book should be new as that it should be bound in colored cloth. Your confirmed novel-reader has a holy horror of second perusals, and would rather read any trash for the first time than Pendennis or Pride and Prejudice for the second. The book must be written in the dialect and grammar of to-day. No word, no construction, no phrase which is not current in the newspaper must be used. A racy and idiomatic style, fed by the habitual reading of our old English literature, would choke the young man who does the literature for the *Daily Telegraph*, and he would issue in "the largest circulation in the world" a complaint that Mr. —— seems to write strange English! Our modern reader requires his author's book, as he does his newspaper leader or his clergyman's sermon, to be the echo of his own sentiments. If Lady Flora were to ask me to recommend her a book to read, and I were to suggest Johnson's Lives of the Poets, do you think she would ever ask my advice again? Or, if I were to mention Trevelyan's Life of Lord Macaulay, the best biography written since Lockhart's Life of Scott, she would say, "We had that long ago" (it came out in 1876); "I mean a *new* book."

To a veteran like myself, who have watched the books of forty seasons, there is nothing so old as a new book. An astonishing sameness and want of individuality pervades modern books. You would think they were all written by the same man. The ideas they contain do not seem to have passed through the mind of the writer. They have not even that originality—the only originality which John Mill in his modesty would claim for himself—"which every thoughtful mind gives to its own mode of conceiving and expressing truths which are common property"—(*Autobiography*, p. 119). When you are in London step into the reading-room of the British Museum. There is the great manufactory out of which we turn the books of the season. We are all there at work for Smith and Mudie. It was so before there was any British Museum. It was so in Chaucer's time—

> "For out of the olde fieldes, as men saythe,
> Cometh all this newe corn fro yere to yere,
> And out of olde bookes in good faithe
> Cometh all this newe science that men lere."

It continued to be so in Cervantes' day. "There are," says Cervantes in Don Quixote (32), "men who will make you books and turn them loose in the world with as much dispatch as they would do a dish of fritters."

It is not, then, any wonder that De Quincey should account it (Life of De Quincey, i. 385) "one of the misfortunes of life that one must read thousands of books only to discover that one need not have read them," or that Mrs. Browning should say, "The *ne plus ultra* of intellectual indolence is this reading of books. It comes next to what the Americans call whittling." And I cannot doubt that Bishop Butler had observed the same phenomenon which has been my subject to-night when he wrote, in 1729, a century and a half ago (Preface to Sermons, p. 4): "The great number of books of amusement which daily come in one's way, have in part occasioned this idle way of considering things. By this means time, even in solitude, is happily got rid of without the pain of attention; neither is any part of it more put to the account of idleness, one can scarce forbear saying is spent with less thought, than great part of that which is spent in reading."—*Fortnightly Review.*

YOUNG MUSGRAVE.

BY MRS. OLIPHANT.

CHAPTER XXXI.

A CRISIS AT PENNINGHAME.

ALL this time the old squire lay in the same stupor of death in life. He did not rally. Sometimes there was a look in his eyes—a quiver as of meaning, between the half-closed lids. But they could not tell what it meant, or indeed if it was anything but vague reflection of the light that would break in through a drawn curtain or raised blind. There he lay, day after day, wearing out all his nurses. If he ever slept, or ever was awake no one could tell; but this old man, in the grip of deadly disease, lay there motionless, and tired out all the younger people who watched over him. A nurse had been got for him from the market town, and Mary was rarely out of the sick-chamber. Both of these attendants were worn to death as the monotonous days and nights went past; but the squire lay just the same. They grew pale and hollow-eyed, but he apparently had stopped short, at the point where he was when their vigil began.

In these circumstances, all the world flocked to Penninghame to inquire for Mr. Musgrave. Rural importance shows in such circumstances. He was "by rights," the greatest man in the district, though superior wealth had come in and taken his pre-eminence from him—but everybody recollected his pretensions now. Inquiries came for him daily from every one near who could pretend to be anything. The great great people, and the small great people, the new families and the old, the clergy (who were as good as anybody), and all who sought for a place among the gentry, with whatever hope or right, all interested themselves about the invalid. "His eldest son is still living, I suppose. And what will happen when Mr. Musgrave dies?" the people asked. And all who had any possibility of knowing, all who had any right to know, exerted themselves to supply answers to this question. One had it on the best authority, that John Musgrave was waiting, ready to come home, and that there would be another trial immediately. Some, on the other hand, were certain that John Musgrave never would come home at all to tempt Providence. "There will be an effort made to pass him over, and make his own son heir instead," they said; and some believed it to be certain that the other brother would pension him off, so that the house might not be shamed by a convict squire.

Naturally, Mary knew nothing about these discussions. She spent her time in her father's room, relieving the nurse when her hours for sleep came, resting herself only when she could no longer bear up against the fatigue, seeing nobody but Mr. Pen and Lilias. Mary took little notice now of Nello's departure, and the schoolmaster's letter. It had all been done against her will, but she was too much occupied, now that it was done, to dwell upon it. It was very shameful that he was so backward, and perhaps Mr. Pen and Randolph were right in sending him to school. Her mind was too much preoccupied for the moment to give anything but this half-angry, reluctant assent to what had been done. And perhaps it would be better *now* if Lilias could go to school too, out of this melancholy house, out of the loneliness which was so hard upon the child. But Lilias was the only consolation Mary herself had; she had grown to be part of herself during this long year. It might be doing the child injustice, as she feared; but how could she send her only companion, her consoler and sympathiser, away? As for Lilias, though she was deeply moved by Nello's departure, the want of news of him did not move her much. Her father never wrote, never communicated with the child. They had not the custom of letters. It was very dreary, no doubt, but still when he came back unexpectedly, perhaps just at the moment he was most wanted, stepping in, with all the delight of surprise, added to the pleasure of again seeing the absent, that was worth waiting for. This was the philosophy of the family. It was not their habit to write letters. Lilias ac-

cepted her own loneliness with resignation, not thinking of any possible alleviation; and she watched, sitting at the door of the old hall, for every one who might come along the road. It was October—the days getting short, the air more chilly, the sun less genial. The woods began to put on robes of color, as if the rosy sunset clouds had floated down among them. The air blew cold in her face, as she sat outside the hall door. Martuccia within, in the background, shivered, and drew her shawl more closely across her ample shoulders. But Lilias did not feel the cold. She was looking out for some one—for papa who might come all at once, at any time—for Mr. Geoff, who might bring news of papa—for something to come and break the monotony of this life. Something Lilias felt sure must be coming; it could not go on like this for ever.

"Nello was always company for his sister," Mary said. Though she assented, she could not but complain. She had come out to breathe the air, and was walking up and down, Mr. Pen by her side. "It is very hard upon Lily, just at this moment, when everything is hanging in the balance, that her little brother should have been sent away."

"It would be very well," said Mr. Pen, "if you would send her away too. Nello wanted it. He would never have learned anything at home. He will come back so much improved. If he is to be received as the heir of everything——"

"If, Mr. Pen?"

"Well; I would not go against you for the world; but there is truth in what Randolph says. Randolph says there must be certificates of his birth, and all that; quite easy—quite easy to get—but where is your brother John to look after it all? He ought to be here now."

"Yes, he ought to be here. But would it be safe for him to come, Mr. Pen?"

"Miss Mary, I can't help wondering about that," said Mr. Pen, with troubled looks: had he grown unfaithful to John? "if he is innocent, why shouldn't he come *now?* No jury would convict——"

Mary stopped him with a motion of her hand.

"Randolph has been gaining you over to his side," she said. They were walking up and down the road close to the house. Just where the great gates ought to be—if the Musgraves were ever rich enough to restore the courtyard of the old castle—was the limit of their walk. Mary could not allow herself to be out of reach even for an hour. She was here, ready to be called, in case her father should come to any semblance of himself. "I do not say he has not some reason on his side, now that my father is—as he is. Everything seems to have grown so much nearer. It is dreadful not to know where John is, not to be able to communicate with him. I wrote to the last place they were living—the place the children came from—but I have never had any answer. When my poor father goes—as go he must, I suppose—what am I to do?"

"You must let Randolph manage for you. Randolph must do it. God knows, Miss Mary, I don't want to go against you——"

"But you do," she said, with a half smile. She smiled at it, but she did not like it. It is hard, even when a dog, who has been your special follower, turns away and follows some one else. "You never did it before since we have known each other, Mr. Pen."

Poor Mr. Pen felt the reproach. He was ready to weep himself, and looked at her with wistful deprecating eyes; but was it not for her sake?

"I don't know what else to say to you. It breaks my heart to go against you," he said. "Whatever pleases you seems always best to me. But Randolph says—and I cannot deny it, Miss Mary, there's truth in what he says."

"Yes, there's truth in what he says. He has got the child away, and placed him out of reach, with your help, Mr. Pen; and he will push the father away, out of his just place, and make all the difficulties double. He has put you against him already that was his friend, and he will put other people against him. I begin to see what he is aiming at!" cried Mary, clasping her hands together, with indignant vehemence.

Mr. Pen did not know what to say or do to soothe her. He was full of compunction, feeling himself guilty. He to have turned against her! He felt all the horror of it to his very heart.

"We should be just to Randolph too," he said, tremulously; "he means to do what's right. And if I seem to cross you, 'tis but to serve you, Miss Mary. How could you stand in the breach, and bear all that will have to be borne? If Randolph does not come to do what has to be done, you would have to do it; and it would be more than should be put upon you."

"Have I ever shrunk from what has to be done?" she said, with again a half smile of pained surprise.

Mr. Pen had no answer to make; he knew very well she had not failed hitherto; and in his heart he was aware that Randolph's motives were very different from Mary's. Still, he held with a gentle obstinacy to the lesson he had learned. It was going against her, but it was for her sake. They took one or two turns together in silence, neither saying any more. As they turned again, however, towards the house for the third time, Eastwood met them hurrying from the door. Nurse had sent down stairs for Miss Musgrave, begging her to come without delay. The urgent message, and the man's haste and anxious eager looks frightened Mary. The household generally had come to that state of expectation which welcomes any event, howsoever melancholy, as a relief to the strain of nerve and strength which long suspense produces. Eastwood was eager that there might be some change—if for the better, so much the better—but that was scarcely to be looked for—anyhow a change, a new event. The same thrill of anticipation ran through Mary's veins. Was it come now—the moment of fate, the crisis, which would affect so many? She bid Mr. Pen to follow her, with a movement of her hand. "Wait in the library," she said, as she went up stairs.

While Mary took the air in this anxious little promenade up and down, Lilias sat at the hall door, looking out upon the road, looking far away for the something that was coming. She did not know that the rider on the pale horse was the most likely passenger to come that way. Happier visitors were in Lilias's thoughts—her father himself (to clear up everything) who would go and fetch Nello back, and put all right that was wrong; or Mr. Geoff, who was not so good, but yet very comforting, and between whom and Lilias there existed a link of secret alliance, unknown to anybody, which was sweet to the child. Lilias was looking out far upon the road, vaguely thinking of Geoff, for he was the most likely person to come—he who rode along the road so often to ask for the squire: far more likely than her father, who was a hope rather than an expectation. She was looking far away, as is the wont of the dreamer, pursuing her hope to the very horizon whence it might come—when suddenly, all at once, Lilias woke to the consciousness that there was some one standing near her, close to her, saying nothing, but looking at her with that intent look which wakes even a sleeper when fixed upon him, much more a dreamer, linked to common earth by the daylight, and all the sounds and touches of ordinary life. She rose to her feet with a start—frightened yet satisfied—for here was something which had happened, if not the something for which she looked. But Lilias's eyes enlarged to twice their size, and her heart gave a great jump, when she saw that the figure standing beside her was that of the old woman whom she had met in the Chase.

'Lizabeth had come up unobserved from the water-side. She was dressed exactly as she had been before, with the hood of her grey cloak over her white cap—a stately figure, notwithstanding the homely dress.

Lilias gave a cry at the sight, and ran to her.

"Oh, old woman!" she cried—"oh, I want to ask you—I want to ask you so many things."

"Honeysweet!" said 'Lizabeth, with a glow in her dark eyes. She did not for a moment think, either of what she had come to say, or of the risks that attended her communications with her daughter's child. She thought only of the face she saw reflected in that other face, and of the secret property she had in the child who was so beautiful and so sweet. This was 'Lizabeth's heiress, the inheritor of the beauty which the old woman had been conscious of in her own person, and still more conscious of in the person of her daughter. Lilias was the third in that fair line. Pride filled the old woman's heart, along with the

warm gush of tenderness. No one had ever looked at Lilias with such passionate love and admiration. She did not venture to take the child into her arms as she had done in the solitude of the woods, but she looked at her with all her heart in her eyes.

Lilias seized her by the hand and drew her to the seat from which she had herself risen. "Come!" she said eagerly. "They say you know everything about papa—and I have a right to know; no one has so good a right to hear as I. Oh, tell me! tell me! Sit down here and rest. I once went up the hill, far away up the hill to go to you, but there I met Mr. Geoff. Do you know Mr. Geoff? Come, come, sit down here and tell me about papa——'

"My darling," said 'Lizabeth, "blessings on your bonnie face! but I dare not stay. Some time—soon, if it's God's will, you'll hear all the like of you could understand, and you'll get him back to enjoy his own. God bless my bairn that would give me her own seat, and think no shame of old 'Lizabeth! That's like my Lily," the old woman said, with ready tears. "But listen, honey, for this is what I came to say. You must tell the lady to send and bring back the little boy. The bairn is in trouble. I cannot tell you what kind of trouble, but she must send and bring him back. My honey, do you hear what I say?" "The little boy, and the lady?" said Lilias wondering; then she exclaimed suddenly with a cry of pain, "Nello! my little brother!" and in her eagerness caught 'Lizabeth's hands and drew her down upon the seat.

"Ay, just your little brother, my honeysweet. My lad is away that would go and look after him, so you must tell the lady. No, no, I must not stay. The time will maybe come. But tell the lady, my darling. The little boy has need of her or of you. He is too little a bairn to be away among strangers. I cannot think upon his name—nor I cannot think," said 'Lizabeth with a gleam of grandmotherly disapproval, "what my Lily could be thinking of to give a little lad such an outlandish name. But tell the lady to send and bring him home."

"Oh, I will go, I will go directly. Wait till I tell you what Mary says," cried Lilias; and without pausing a moment, she rushed through the hall, her hair flying behind her, her face flushed with eagerness. The old woman stood for a moment looking after her with a smile; listening to the sound of the doors which swung behind the child in her rapid course through the passages which led to the inhabited part of the house. 'Lizabeth stood stately yet rustic in her grey cloak, with her hands folded, and looked after Lilias with a tender smile on her face. She had nothing left to be proud of, she so proud by nature, and to whom it was the essence of life to have something belonging to her in which she could glory. 'Lizabeth's pride had been broken down with many a blow, but it sprang up again vigorous as ever on the small argument of this child. Her beauty, her childish refinement and ladyhood gave the old woman a pleasure more exquisite perhaps than any she had ever felt in her life. There was little in her lot now to give her pleasure. Her daughter was dead, her days full of the hideous charge which she had concealed for so many years from all the world; and she was old, approaching the end of all things, with nothing better to hope for, than that death might release her unfortunate son before herself. Yet as she stood there, looking after the little princess who was of her blood, her representative, yet so much above anything that had ever belonged to 'Lizabeth, there was a glow through all her veins, more warm, more sweet than any she had ever felt in her life. Pride, and love, and delight swelled in her. Her child's child—heir of her face, her voice, all the little traits of attitude and gesture, which mark individuality—and yet the young lady of the castle born to a life so different from hers. She stood so gazing after Lilias till the sound of her feet and the door closing behind her had died away. Her heart was so full that she turned to Martuccia sitting motionless behind with her knitting. "Oh, that her life may be as sweet as her face!" she said involuntarily. Martuccia turned upon her with a quiet smile, but shook her head and said, "Not speak Inglese." The sound of the voice called 'Lizabeth to herself. The smile faded from her face. Little had she to smile for, less than

ever at this moment. She sighed, coming to herself, and turned and walked away.

Lilias ran against Mary as she entered the house at Eastwood's call. "Oh!" she cried, breathless, "Nello! will you send for Nello? Oh, Mary, he is in trouble, the old woman says—he is ill, or he is unhappy, or I cannot tell you what it is. Will you send for him, will you send for him, Mary? What shall I do? for papa will think it was my fault. Oh Mary, Mary, send for my Nello! Wait a moment, only wait a moment, and hear what the old woman says——"

"Speak to her, Mr. Pen," said Mary. "I cannot stay." She was going to her father who must, she felt sure, want her more urgently than Lilias could. Even then it went to Mary's heart to neglect the child's appeal. "Mr. Pen will hear all about it, Lilias," she said, as she hastened up stairs. But Mr. Pen paid very little attention to what Lilias said.

"An old woman? What old woman? My dear child, you cannot expect us at such a moment as this—" said the vicar. He was walking up and down the library with his ears open to every sound, expecting to be called to the Squire's bedside, feeling in his pocket for his prayer-book. For it seemed to Mr. Pen that the hasty summons could mean only one thing. It must be death that had come—and it would be a happy release—what else could any one say? But death, even when it is a happy release, is a serious visitor to come into a house. He has to be received with due preparation, like the potentate he is. Not without services of solemn meaning, attendants kneeling round the solemn bedside, the commendatory prayer rising from authorised lips—not without these formulas should the destroying angel be received into a Christian house. He was ready for his part, and waiting to be called; and to be interrupted at such a moment by the tales of an old woman, by the grumblings of a fretful child sent to school against his will—even the gentle Mr. Pen rebelled. He would not hear what Lilias said. "Your grandfather is very ill, my dear," he told her solemnly, "very ill. In an hour or so you may have no grandfather, Lilias; he is going to appear in the presence of God——"

"Is he afraid of God, Mr. Pen?" asked Lilias with solemn eyes.

"Afraid!—you—you do not understand. It is a solemn thing—a very solemn thing," said the vicar, "to go into God's presence; to stand before Him and answer——"

"Oh!" cried the little girl, interrupting him, "Nello is far worse, far worse. Would God do him any harm, Mr. Pen? But cruel people might do a little boy a great deal of harm. God is what takes care of us. The old gentleman will be safe, quite safe there; but my Nello! he is so little, and he never was away from me before. *I* always took care of him before. I said you were not to send him away, but you would not pay any attention. Oh, my Nello, my Nello, Mr. Pen!"

"Hush, Lilias, you do not know what you are speaking of. What can Nello's troubles be? Perhaps the people will not pet him as he has been petted; that will do him no harm whatever—it will be better for him. My dear, you are too little to know. Hush, and let me listen. I must be ready when I am called for. Nothing that can happen to Nello can be of so much importance as this is now." And the vicar went to the door to look out and listen. Lilias followed him with her anxious eyes. She was awed, but she was not afraid for the old gentleman. Would God hurt him? but anybody that was strong could hurt Nello. She made one more appeal when the vicar had returned, hearing nothing and leaving the door ajar.

"Mr. Pen! Oh, please, please, think of Nello a little! What am I to do? Papa said, 'Lily, I trust him to you—you are to take care of him.' What shall I say to papa if he comes home and asks me, 'Where is my little Nello?' Papa may come any day. That is his way, he never writes to tell us, but when he can, he comes. He might come to-day," cried Lilias. "Mr. Pen, oh, send somebody for Nello. Will you not listen to me? What should I say to papa if he came home to-day?"

"My dear little Lilias," said Mr. Pen, shaking his head mournfully, "your papa will not come to-day. Heaven knows if he will ever be able to come. You must not think it is such an easy matter. There are things which make it very

difficult for him to come home; things of which you don't know——"

"Yes," said Lilias eagerly, "about the man who was killed; but papa did not do it, Mr. Pen."

Mr. Pen shook his head again. "Who has told the child?" he said. "I hope not—I hope not, Lilias, but that is what nobody knows."

"Yes," she cried, "Mr. Geoff knows; he told me. He says it was another man, and that papa went away to save him. Mr. Pen, papa may come any day."

"Who is Mr. Geoff?" said the vicar; but he did not pay any attention to what the child was saying. There seemed to be a sound on the stairs of some one coming down. "Oh, run away, my dear! run away! Run and play, or do whatever you like. I have not time to attend to you now."

Lilias did not say a word more, or even look at him again, but walked away with a stately tread, not condescending even to turn her head towards him. In this solemn way she went back to the hall, expecting to find 'Lizabeth; but when she found that even the old woman was gone, in whom she put a certain trust as the one person who knew everything. Lilias had a moment of black despair. What was she to do? She stood and gazed out into vacancy—her eyes intent, her mind passionately at work. It was to her after all, and not to Mary, that Nello had been intrusted, and if nobody would think of him, or attend to him, it was she who must interfere for her brother. She stood for a minute or two fixed—then turned hastily, paying no attention to Martuccia and went to her room. Lilias, too, had a sovereign which Mary had given her, and some few shillings beside. She took them out of their repository and put on her hat and jacket. A great resolution was in her face. She had seen at last what was the only thing to do.

"I think, ma'am, there is a change," the nurse said, as Mary noiselessly but swiftly, as long nursing teaches women to move, came into the room. The nurse was an experienced person. When Miss Brown, and even Mary herself, had seen "a change," or fancied they had seen it before, nurse had never said so. It was the first time she had called any one to the Squire's room, or made the slightest movement of alarm. She led the way now to the bedside. The patient was lying in much the same attitude as before, but he was moving his hands restlessly, his lips were moving, and his head on the pillow. "He is saying something, but I cannot make out what it is," the nurse said. Mary put her ear close to the inarticulate mouth. How dreadful was that living prison of flesh!—living, yet dead!—the spirit pent up and denied all its usual modes of utterance! Mary wrung her hands with a sense of the intolerable as she tried in vain to distinguish the words, which seemed to be repeated over and over again, though they could make nothing of them. "Cannot you help us?—can you make it out? Is there nothing we can do?" she cried; "no cordial to give him strength?" but the nurse could only shake her head, and the doctor, when he came, was equally helpless. He told Mary it was a sign of returning consciousness—which, indeed, was evident enough—but could not even say whether this promised for or against recovery. The nurse, it was clear, did not think it a good sign. He might even recover his speech *at the end*, she said. And hours passed while they waited, watching closely lest any faint beginning of sound should struggle through. The whole night was passed in this way. Mary never left the bedside. It was not that he could say anything of great importance to any one but himself. The Squire was helpless as respected his estate. It was entailed, and went to his eldest son, whether he liked it or not; and his will was made long ago, and all his affairs settled. What he had to say could not much affect any one; but of all pitiful sights, it seemed to his daughter the most pitiful, to see this old man, always so entirely master of himself, trying to make some communication which all their anxiety could not decipher. Could he be himself aware of how it was that no response was made to him?—could he realise the horror of the position?—something urgent to say, and no way of getting to the ears of those concerned, notwithstanding their most anxious attention? "No, no," the nurse said, "he's all in a maze; he maybe don't even know what he's saying;" and the constant movement and evident

repetition gave favor to this idea. Mary stood by him, and looked at him, however, with a pain as great as if he had been consciously laboring on one side of that bed to express himself as she was on the other to understand him, instead of lying, as was most probable, in a feverish dream, through which some broken gleam of fancy or memory struggled. When the chilly dawn broke upon the long night, that dreariest and coldest moment of a vigil, worn out with the long strain, she dropped asleep in the chair by her father's bedside. But when she woke hurriedly, a short time after, while yet it was scarcely full day, the nurse was standing by her with a hand upon her shoulder. The woman had grasped at her to wake her. "Listen, ma'am, he says—'the little boy,'" she said. Mary sprang up, shaking off her drowsiness, in a moment. The old man's face had recovered a little intelligence—a faint flush seemed to waver about his ashy cheeks. It was some time before even now she could make any meaning out of the babble that came from his lips. Then by degrees she gleaned, now one word, now another. "Little boy—little Johnny; bring the little boy." She could scarcely imagine even now that there was meaning in the desire. Most likely it was but some pale reflection through the dim awakening of the old man's mind, of the last idea that was in it. It went on, however, in one long strain of mumbled repetition—"Little Johnny — little boy." There seemed nothing else in his mind to say. The nurse laid her hand once more on Mary's arm, as she stood by her, listening. "If you can humor the poor gentleman, ma'am, you ought to do it," said the woman. She was a stranger, and did not know the story of the house.

What could Mary do? She sent out one of the servants to call Mr. Pen, who had stayed late in the previous night, always holding his book open with his finger at the place, but who got up now obedient at her summons, though his wife had not meant to let him be disturbed for hours. Then the feeble demand went on so continuously, that Mary in despair sent Miss Brown for Lilias, vaguely hoping that the presence of the one child might perhaps be of some use in the dim state of semi-consciousness in which her father seemed to be. Miss Brown went with hesitation and a doubtful look, which Mary was too much occupied to notice, but came back immediately to say that Miss Lilias had got up early and gone out. "Gone out!" Mary said, surprised, but she had no leisure to be disturbed about anything, her whole mind being preoccupied. She went down stairs to Mr. Pen when he came. He had his prayer-book all ready. To dismiss the departing soul with all its credentials, with every solemnity that became such a departure, was what he thought of. He was altogether taken by surprise by Mary's hasty address—

"Mr. Pen, you must go at once and bring Nello. I cannot send a servant. He would not, perhaps, be allowed to come. If you will go, you can fetch him at once—to-morrow, early."

"But Miss Mary——"

"Don't say anything against it, Mr. Pen. He is asking for the little boy, the little boy! Nello must come, and come directly. You would not cross him in perhaps the last thing he may ever ask for?" cried Mary, the tears of agitation and weariness coming in a sudden gush from her eyes.

"Let me send for your brother," said the vicar. "Let me send for Randolph. He will know best what to do."

"Randolph! what has he to do with it?" she cried. "Oh go, Mr. Pen; do not vex me now."

"I will go." Mr. Pen closed his book with regret and put it into his pocket. He did not like the idea that the old Squire should depart out of the world like any common man, uncared for. After his long connection with the family, that such a thing should happen without him! Mr. Musgrave had not perhaps been so regardful as was to be desired of all the services of the Church, and Mr. Pen was all the more anxious, now that he could have everything his own way, that all should be done in order. But how could he resist Mary's will and wish? He put his book in his pocket with a sigh.

"I will do what you wish, Miss Mary; but—it is a journey of many hours—and trains may not suit. Do you think he will—go on—so long?"

"He is asking for the little boy," said Mary, hastily. "Come and see him, and

t will go to your heart? How can I tell you any more? We do not know even whether he is to live or to die."

"Ah, you must not cherish false hopes," said the Vicar, as he followed her up stairs. The servants were peeping on the staircase and at the doors; they were half disappointed, like Mr. Pen, that the "change" was not more decided. They had hoped that all was nearly over at last.

The darkened room where the night-light was still burning though full day broke in muffled through the half-shuttered windows, was of itself very impressive to Mr. Pen, coming out of the fresh fullness of the morning light. He followed Mary, going elaborately on tiptoe round the foot of the great heavily-curtained bed. The Squire's head had been propped up a little. He had become even a little more conscious since Mary had left him. But his voice was so babbling and inarticulate that Mr. Pen, unused to it, and deeply touched by the condition in which he saw his old friend and patron, could not make out the words—"Bring the little boy—the little boy, not Randolph—little Johnny: bring the little boy." Thus he went murmuring on, and there had gradually come a kind of wish into the face, and a kind of consciousness of their presence. "I wanted to bring Lilias, but Lilias they tell me has gone out; I cannot tell where she can have gone," Mary whispered. "And he never took any notice of Lilias—it is the boy he wants—listen, Mr. Pen, always the boy."

"I cannot make anything of it," said Mr. Pen, moved to tears.

"Oh listen! He says not Randolph, the boy! It is the boy he wants. Look! I almost think he knows you. Oh, what is it he wants?" cried Mary.

The light which had been so nearly extinguished was leaping up in the socket. A sudden convulsion seemed to run over the old man's frame: he made an effort to raise himself. His ashen face grew red, perspiration burst out upon his forehead. Ghostlike and rigid as he was, he moved himself upward as if to get from his bed. The nurse had put herself quietly at her post on one side and she called to Mary to go to the other, while poor Mr. Pen stood by helpless, as if he were assisting at a visible resurrection. "Don't get excited, ma'am," the nurse said steadily; "one moment! I hear the doctor coming up stairs."

The steady tread of some one approaching reassured the women as they half aided, half controlled, the spasmodic force of apparent recovery. The foot came nearer and nearer, thank God. The door opened and some one came in.

It was not the doctor. It was a tall man, with light hair mingled with gray and a fair complexion turned brown. He came straight into the room like one familiar with the place. Miss Brown, who stood near the door, recoiled with a quivering cry, and Mr. Pen, whom he encountered next, fell back with the same quaver of consternation in his voice. He went to where Mary stood, who alone had not looked at him, her eyes being intent on her father's face. He put her aside tenderly, taking her place. "This is my work as much as yours," he said.

(To be continued.)

A STUDY OF THOREAU.*

BY THOMAS HUGHES.

If any believer in the doctrine of general average has turned his mind to the statistics of New England, we should be glad to know what he makes of the curious production of noteworthy citizens in the little town of Concord in the last half-century. Twenty years ago, Emerson, Hawthrone, Thoreau, Judge Hoar, the Alcotts (father and daughter), besides several other persons whose names are not so well known here, but of whom Concord has good reason to be proud, were all living in the township, and, we believe, claimed it as their birthplace, The university town of Cambridge.

* *Thoreau, his Life and Aims.* A Study. By H. A. Page. London: Chatto & Windus. Boston: J. R. Osgood & Co.

which lies within an easy drive on the Boston road, the natural centre of the brightest and most learned society of the old Bay State, could scarcely have furnished a more remarkable group; and the Western Athens herself (leaving political and commercial notabilities out of the count) certainly could not have done so. Up to that time, the claim of Concord to special distinction among New England townships rested on the ruins of the bridge across which the first shots were fired in the War of Independence, and the graves of the British soldiers who fell there. Now there is the "Old Manse," the mosses of which Hawthrone has preserved; and Emerson's house, with the new library which his fellow-townsmen built for him after the fire, and which all readers of English trust he may yet enjoy for many years. These are solid structures which we may hope will not be allowed to disappear as has been the case with a neighboring habitation of scarcely less interest—Thoreau's log-cabin. It was built by the "poet naturalist" in Walden Wood, some two miles distant from Concord, "in the middle of a young forest of pitch pines and hickories," in 1845, was inhabited by him for two years and two months, and then left to tumble down. Recent English pilgrims have reported that they could find no trace of it; and we rather infer from Mr. Page's book that no trace of it is to be found even by natives who know where to look for it. But if the visible tabernacle has disappeared, the spirit which inhabited it, and the idea which it was intended to illustrate practically, have gained rather than lost in interest. The thirty years which have passed since Thoreau came back out of Walden Wood, to attend to his father's business of pencil-making, have added more than the previous century to the "trappings and baggage" of social life which he held, and taught by precept and example that men would be both better and happier for doing without. And while we succumb and fall year by year more under the dominion of these trappings, and life gets more and more overlaid with one kind and another of upholsteries the idea of something simpler and nobler probably never haunted men's minds more than at this time.

And so a study of the life and aims of Thoreau should prove attractive, though there may be an inclination in our day to seek the higher life in the direction of new kinds of association rather than in solitude; and earnest young persons dissatisfied with the surroundings in which they find themselves may choose to follow Hawthorne to Brook Farm rather than Thoreau to Walden Wood. "The man who goes alone can start today," was one of his sayings; "but he who travels with another must wait till that other is ready, and it may be a long time before they get off." It is this self-contained and self-sustaining temper which gives zest to all that Thoreau does and says, and makes him so thoroughly original. What he desires is "so to love wisdom as to live according to its dictates a life of simplicity, independence, magnanimity, and trust;" and having come to the conclusion that "a primitive and frontier life in the midst of an outward civilization" would best teach what the essential facts or "gross necessaries" of life are—what a philosopher can and what he cannot do without—proceeded to live it in the wood nearest his own home. This determination to live simply rather than his love for birds and beasts and trees and sunsets seems to have been the motive of his life in the woods; but, whatever the motive, the result is fascinating. The wood-chucks and squirrels and mice he looked upon as "rudimental burrowing men, still standing on their defence, awaiting their transformation;" the birds were his sisters, and lived with him without fear; he kept an account of all the plants, and would read out from his diary on what day each would bloom as a banker knows when his notes fall due. If waked up from a trance in the swamp he thought he could tell by the plants what time of year it was within two days. "He knew the country," Emerson says of him, "like a fox or a bird, and passed through it freely by paths of his own. He saw as with a microscope, heard as with an ear-trumpet, and his memory was a photographic register of all he saw and heard."

Mr. Page is greatly attracted by this sympathy of Thoreau's with nature, and his strangely intimate relations with the animal creation, and gives many delight-

ful illustrations of it, holding (if we understand him rightly) that his peculiar gifts fitted him specially to deal with outward things, and it would have been well if he had remained a quick-eyed and sympathetic recorder of the life of nature. He thinks that Emerson's influence had a deteriorating effect upon Thoreau, and developed an effusive egotism which appears in his writings when he leaves the ground of facts for general disquisition. We have no space to do more than refer to this interesting question, which would require a more intimate acquaintance with Thoreau's writings than we possess to determine. So far, however, as appears on the face of this Memoir the influence of the master seems to have worked for good only. We question whether it was ever in Thoreau to become a great scientific naturalist. Indeed, he says as much himself in the singularly characteristic passage in which he protests against separating the life of the naturalist from his science, ending with a sentiment which to a scientific purist must sound, we take it, like rank heresy: "The purest science is still biographical; nothing will dignify and elevate science while it is sundered from the moral life of its devotee, and he professes another religion than it teaches." If it be replied that he would never have uttered such heresies but for Emerson and transcendentalism, one can only say that in that case we should have been the losers; for then the hermit of Walden would not have been himself, and we should have missed all acquaintance with one of the most attractive and distinct personalities of our time. As little can we share Mr. Emerson's sorrow that Thoreau's energy and practical ability led to no great enterprise:—"I so much regret the loss of his rare powers of action that I cannot help counting it as a fault in him that he had no ambition—wanting this, instead of engineering for all America he was the captain of a huckleberry party." Surely such regrets are scarcely in accord with the master's own teaching. The young American was always counselled by him to bide his time; to sit still, and only be careful not to lie, till his call came, as it surely would in due time. No great cause appealed to Thoreau until the Dred Scott case was decided, and it is difficult to see how he could have served the cause of Abolition more faithfully than he did from that hour. His speeches on the Slavery question, and in defence of John Brown, whom he stood forward to justify when all Massachusetts was in doubt and temporizing, show that he could lead bravely when he saw the occasion. In short, we are too grateful for Thoreau as he was to wish that the times or his teachers had made him anything else, and believe that many besides ourselves will be thankful to Mr. Page for having given us the best picture of the man which we have hitherto met with.—*The Academy.*

A WORD ON RICH FOLKS.

We have never quite understood why among preachers and moralists there should be such a sweeping denunciation of riches. The rich man is called all that is bad. The poor man—no matter that he had been a spendthrift—is prescriptively an ill-used saint, for whom not enough can be done. The older notions on the subject perhaps originated in the fact that riches were too frequently accumulated by robbery and oppression; which is not unlikely, for until this day in certain eastern countries, of which Turkey is a luminous example, riches are usually a result of some sort of extortion if not actual violence. And if so, we need not wonder that the poor were reckoned among the oppressed and specially worthy of compassion.

However the ancient opinions regarding riches originated, it is surely full time that new and more rational views were entertained, or at least professed, on the subject. In Western Europe, men do not now go about plundering and oppressing by armed force, as in the days of old. The poorest are protected by the law. As a general rule, riches are accumulated by a course of patient industry, and the reputedly wealthy are among the most careful in setting the example of doing good. Of course our mixed state of society is not without instances of wealth being re-

alized by jobbery, by fraudulent exploits among speculators. But these are exceptions which a wise man does not fasten upon, except to point the moral, that ill-gotten riches seldom last long, and that their possessors are anything but respected. Why then persist in holding up the wealthy to reprobation? The truth is, the cry is little better than a sham. The very preachers who talk reproachfully and warningly of riches, seldom fail to be as zealous in the pursuit of riches as their neighbors. And in this no one can rationally blame them. Every man within his proper calling is entitled as a matter of duty to himself and those dependent on him to use all legitimate means for bettering his condition, and, if possible, increasing in wealth. It is indeed only by the prudential exercise of these privileges that society is held together and advanced in civilization. It is very pleasant to see honest poverty decently struggling with circumstances, and maintaining a good character amidst adversity; but we deny altogether that poverty alone is synonymous with virtue, and to be held up as meritorious. Without riches, even comparatively small, little good can be done. Wealth—meaning by that a surplus of gains beyond what are required for daily subsistence—is obviously the source of universal comfort. Money is above all things potential. It hires labor, gives the employment which so many stand in need of. It sets up manufactories, organizes railways, puts ships on the ocean, pays for machinery, builds and improves towns, schools, and churches, encourages learning, enlarges processes of husbandry with a view to ever-increasing demands for food. The most skilful and willing workman, when placed in a country without money wherewith to employ him, is as helpless in the attempt to realize the wages of labor as the merest savage. In short, it is clear that before work can be given, there must in some measure be an accumulation of capital, or in plain language savings, in the hands of a part of the community.

Such being the case, how absurd does it seem to disparage money, as if it were something sinful and dangerous. As well disparage man-power, horse-power, steam-power, or any other power. As a force, money is neither hurtful nor beneficial, neither bad nor good in itself. All depends on the way in which it is used or directed. Gunpowder can blast a quarry and bring forth stones with which a hospital may be built; but the same gunpowder in the hands of the Russians or Turks can blow thousands of men into eternity in a single day. A rich man, if he be unselfish, has in his wealth the power of making his fellow-creatures less coarse, less depraved, and as a consequence, less miserable. From the vantage-ground of high position he can fight a chivalrous battle for the afflicted and him that hath no helper. His good example will have far more effect than that of a poorer man. His influence, if directed to good and merciful objects, is as powerful for good as that of the selfish rich man is for the reverse. 'Nobody should be rich,' said Goethe, 'but those who understand it.' But when a man owns gracefully and usefully, what good may he not do in the way of opening a path for others, and giving them access to whatever civilizing agencies he may himself possess! Therefore we can understand how both religion and philanthropy may treat with respect and even with reverence the motto, 'Put money in thy purse.' May we not even say that it is the desire to 'get on' and to become rich that prevents our sinking into barbarism?

'There is always a reason *in the man*,' says Emerson, 'for his good or bad fortune, and so in making money.' This rule is not without exceptions, for now and then people do become rich by lucky or even by dishonest 'hits;' nevertheless money is in the main representative. Shew me a man who has made fifty thousand pounds, and I will shew you in that man an equivalent of energy, attention to detail, trustworthiness, punctuality, professional knowledge, good address, common-sense, and other marketable qualities. The farmer respects his yellow sovereign not unnaturally, for it declares with all the solemnity of a sealed and stamped document that for a certain length of time he rose at six o'clock each morning to oversee his laborers, that he patiently waited upon seasonable weather, that he understood buying and selling. To the medical man, his fee serves as a medal to indi-

cate that he was brave enough to face small-pox and other infectious diseases, and his self-respect is fostered thereby. The barrister's brief is marked with the price of his legal knowledge, of his eloquence, or of his brave endurance during a period of hope-deferred briefiessness.

But besides its usefulness and its being the representative of sterling qualities, the golden smile of Dame Fortune is to be sought for the invaluable privilege of being independent, or at least being out of the horrid incumbrance of indebtedness. A man in debt is so far a slave; while it is comparatively easy for one possessed of ten thousand per annum to be true to his word, to be a man of honor, to have the courage of his opinions. When a man or woman is driven to the wall, the chances of goodness surviving self-respect and the loss of public esteem are frightfully diminished. But while striving to escape from the physical suffering and the mental and moral disadvantages that attend the lot of poverty, we should admit to ourselves the fact, that there are hardly less disadvantages and temptations ready to make us miserable, if we are not on our guard after attaining to a reasonable amount of wealth.

In a meeting assembled to make arrangements for Mr. Moody's last preaching campaign in London, one of the speakers expressed his hope that Mr. Moody would 'do something for the miserable poor of London.' 'I shall try and do so,' was the preacher's reply; 'and I hope also to be able to do something for the miserable rich.' 'The miserable rich!' Some would think the expression almost a contradiction in terms, but it is not; for the rich, while possessing the means, as we have already said, of doing vast good, have nevertheless many things to render them unhappy.

Great wealth is a heavy burden; the life of a rich peer being described as 'made like the life of an attorney by the extent of his affairs.' Even their most cherished means of enjoyment may become the possibilities of vexation to the rich. Some may think it is a fine thing to be a landlord, but there is hardly any position more irksome. There is no end of trouble with tenants. The same thing with servants. People who have many servants are sometimes worse served than those who have only one; for what is every one's business is nobody's, and each individual servant is ready with the answer: 'Oh, that is not in my department,' when asked to do anything. The more valuable is your horse, the greater is your anxiety about his knees. It is proverbially difficult for a lady to be 'mistress of herself though china fall;' but if the sound of broken *delf* rise from the kitchen, 'Another plate' is her indifferent remark. The fact is, every new possession becomes an additional something to be looked after, and adds almost as much to our anxiety as it does to our comfort. There is sound philosophy in the answer a king is related to have given to one of his stable-boys, when meeting him one morning he asked him: 'Well, boy, what do you do? What do they pay you?' 'I help in the stable,' replied the lad; 'but I have nothing except victuals and clothes.' 'Be content,' replied the king; 'I have no more.'

Occasionally there are cast up in our social circle rich folks in an unhappy state of cynicism. They are at a loss what to do with their money. In making their will they demonstrate all sorts of whimsicalities, passing over any recognition of their oldest and most deserving friends, and leaving their means in some odd fashion which everybody laughs at. In such instances it is curious to note the anguish they experience in being asked to assist in charitable contributions. In Dr. Guthrie's Autobiography there is a good illustration of this unhappy state of cynicism into which the rich are prone to fall. There he relates how, in a winter of extraordinary severity, he made an appeal to a lady who had succeeded to a prodigious fortune, on behalf of the starving poor of his parish. In doing so he had no very sanguine hope of success. On being ushered into her room, she turned round, and shewing her thin spare figure, and a face that looked as if it had been cut out of mahogany, grinned and said: 'I am sorry to see ye. What do you want? I suppose you are here seeking siller?' 'The very thing I have come for,' was the Doctor's frank reply. Her next remark demonstrated how little power her riches had of conferring happiness; and

with all her wealth of flatterers, what a poor, lonely, desolate, miserable creature this possessor of more than a million sterling was. 'Ah!' she said, 'there is nobody comes to see me or seek me; but it's money, the money they are after.' We are glad to be able to relate that this miserably rich old lady gave to Dr. Guthrie fifty pounds for the poor—an act which we hope shed a gleam of sunshine into her dark life.

It comes pretty much to this, that with riches there are sundry drawbacks, and that rich people are sometimes as much to be pitied as envied. All know the sharp penalties exacted by nature from those whose only business in life is the pursuit of merely personal gratifications. Wealth gives importance and satisfaction only in proportion to its being administered to a useful purpose. Unhappily, as has been said, there are miserable rich; but their misery is due to themselves. They have failed to see the vast capacities for doing good with which they have been charged. A wealthy person who spends the bulk of his time in the cruelties of pigeon-shooting, or in some other 'sport' connected with the coarse, wholesale destruction of innocent creatures, can be called neither a great nor a good man. At best, we can estimate him as an accomplished gamekeeper.

Luckily, and influenced by the wide expansion of modern ideas, the rich, in the main, rise above paltry gratifications. There is obviously an immense outgrowth in the generous distribution of wealth. In innumerable cases, the rich have a difficulty in determining how to expend their money in a way that will prove beneficial. The question, 'To whom or to what cause shall I contribute money?' must be a very anxious one to conscientious men of wealth. 'How are we to measure,' we may suppose rich men to ask, 'the relative utility of charities? And then political economists are down upon us if by mistake we help those who might have helped themselves. It is easy to talk against our extravagance; tell us rather how to spend our money as becomes Christians;' that is to say, for the greatest good of the greatest number. The fact is, riches must now be considered by all good men as a distinct profession, with responsibilities no less onerous than those of other professions. And this very difficult business ought to be learned by studying social science, and otherwise with as much care as the professions of divinity, law, and medicine are learned. Were the rich in this way to accept and prepare themselves for the duties of their high calling, no one would grumble, because in the nature of things money tends continually to fall into the hands of a few large capitalists.

The value of riches, then, depends on the use that is made of them. No doubt, as hinted at, they are often abused by the thoughtless, the dissolute. But look at the many grand results of properly employed wealth! Consider what is daily being effected in our own country alone by the beneficence of wealthy individuals. What number of charities supported, what churches built, what schools set on foot, what vast enterprises of a useful kind entered into for the general benefit of society. On these considerations, how absurd is that silly declamation against the possession of riches, in which certain orders of persons are indiscreetly pleased to indulge! —*Chambers' Journal.*

TWO SONNETS.

BY EMILY PFEIFFER.

I.—TO A FLEDGLING ROBIN.

Robin, thou art too young as yet to wear
The badge of robinhood in full confest—
The burning breast-plate on the conscious breast—
And hast not learnt to build, to sing, or care;

Only to live, filled with the liberal air,
Which, if it gently breathed from south or west,
Found and o'erflowed thee in thy sheltered nest,
And dwells as marrow in thy feathers fair.

I, weary thinker 'neath the aspen trees,
See thee win past me, lightsome as a bubble,—
No laboring bark, with purblind thought to steer it,
But a plumed will that works with sovereign ease;
Approach, glad life, as free of doubt as trouble,—
I feel as if in presence of a spirit!

II.—TO THE SAME, ON BEGINNING HIS SONG.

Sit at my table, welcome guest, and sing
The olden song, with young, unpractised throat;
I hold my breath to hear the perfect note
Thy tender organs cannot yet make ring.

Sing to me, unpaired fledgling of the spring,
Sing, solace me as if I were thy mate;
Teach me fond patience as I sit and wait,
Brooding quick thoughts with unprogressive wing.

Thy song is faint as breath of unblown flowers,
And only that it shakes thy budding breast,
I could have deemed it homeless; as I hear it,
With lowered eyelids and suspended powers,
I, too, from doubt, and toil, and strain find rest,
And Spirit! seem to hear thee in the spirit.

—*The Spectator.*

REV. JOSEPH COOK.

BY THE EDITOR.

WITHIN the past year or two Mr. Cook has made so wide a reputation as a lecturer that many of our readers will probably be glad to see a good portrait of him, and to learn something of his earlier career. Our engraving is from a recent photograph which is considered an excellent likeness, and the following biographical sketch was compiled from trustworthy sources.

JOSEPH COOK was born in 1838, at Ticonderoga, New York, where his father was and is a farmer with considerable local reputation for mental attainments and fertility of speech. His early years were passed partly at home and partly at a school in Canada, where, among other things, he acquired a knowledge of the French language. At the age of seventeen he entered Phillips Academy at Andover, Mass., and his career there was so remarkable that the memory of it still lives on "Zion's Hill." When but a lad he is said to have replied to his father's inquiry as to the vocation he would select, that he would be "a teacher of teachers;" and one of the noteworthy incidents of his stay at Andover would seem to prove that he had by no means abandoned his calling. As president of the Philomatheon Society, he delivered an address on oratory in which, besides propounding his own somewhat original views, he vigorously assailed the method of teaching elocution then and there practiced by the Professor in that department; and the address made such an impression that it was printed and extensively circulated in pamphlet form. While at Andover, he began with great

Engraved for the Eclectic by J. J. Cade. New York

REV. JOSEPH COOK.

enthusiasm the study of the physical sciences, particularly physiology, and revealed many of those qualities both as thinker and orator which have recently challenged such attention. In 1858 he went to Yale College, and speedily gained a leading position as a scholar; but after remaining there two years and a half, attracted by the literary atmosphere of Cambridge, he went to Harvard University, of which institution he is a graduate.

After graduating at Harvard, Mr. Cook gave four years to the study of theology at Andover, and when his course was completed, officiated as a preacher at Lynn, Abington, and various other places, attracting attention by his vehement rhetoric, but achieving no marked success. After a year of this miscellaneous preaching, he crossed the ocean and spent some years in travel in Italy and Greece, and in study in Germany, where he enjoyed the best advantages the world has to offer in the way of teaching, and where he devoted special attention to biology, physiology, and metaphysics. Returning to Boston in 1873, he at once began, in an informal way, his lectures on the relations between science and religion; then gave courses before churches and colleges, as he happened to be invited; then began, in 1875, to lead the noon prayer-meetings in the Meionaon, where his remarks attracted both attention and audiences. Out of this grew the "Boston Monday Lectureship," which is now organized on a permanent foundation, and in connection with which, during the winter of 1875–6, he delivered those lectures which have carried his fame over two continents. In the December number of the ECLECTIC we have indicated, as fully as our space would permit, the character and quality of these lectures; but no reader who is interested in the great debate between religion and science (or rather between theistic and materialistic views of life) should be satisfied with anything less than a careful perusal of them on his own part.

As we have already remarked, Mr. Cook developed at a very early age those qualities which are now attracting so much attention. Dr. George M. Beard, a fellow-student and friend of Mr. Cook's, says: "Admirers of his oratory may be interested to know that in his early boyhood he was accustomed to practice extemporaneous speaking in the open air in company with a friend. Their habit was to write down a number of topics on slips of paper, put them in a hat, draw one at random, and speak upon it for a specified number of minutes. Dr. Peabody, of Cambridge, speaks of Mr. Cook as an orator born and not made. This is half true and half untrue; he is both—an orator born and an orator made. He has all the physical qualities of the orator. The impression he instantly gives is that of size, quantity, massiveness of being. A life opponent of materialism, he is in his own personality and physique one of the most material of men. In his manner there is at all times, in private as in public, an impressiveness and heartiness that are fully explained by his physiology and psychology, but to which lovers of delusions are wont to apply the vague and incorrect term, animal magnetism. His voice, eyes, countenance, head, hands, and body, generally, are all formed for the orator; but no man of his age, I am sure, has studied oratory more thoroughly or more judiciously than he."

LITERARY NOTICES.

THE PRINCIPLES OF SCIENCE. A Treatise on Logic and Scientific Method. By W. STANLEY JEVONS, LL.D. Second edition, Revised. London and New York: *Macmillan & Co.*

In the short space of four years that have elapsed since the publication of the first edition, Mr. Jevons' treatise, though by no means the kind of work adapted to make a sensational impression, has become a generally accepted standard in its special field. Some critics have not hesitated to pronounce it the most valuable single contribution to the literature of science that has been made since the appearance of Newton's *Principia*, and even those who have exhibited most hostility toward a portion of its methods and conclusions, are agreed in the opinion that it makes real and extremely important additions to our knowledge of the forms and principles of reasoning, while giving increased precision to

that scientific method which constitutes in one sense the philosophy of science, and in another is the instrument by which all scientific discoveries are made and tested. The book cannot be recommended as "easy reading for the million," and considerable knowledge of the higher mathematics and of formal logic is requisite to an intelligent perusal of it; but the reader who has mastered its arguments and the problems that exemplify them, will find himself possessed of a more exact idea of the Laws of Thought and the modes of their operation than he has ever succeeded in obtaining from any other source. The reading of it will be apt to partake the character of study rather than amusement, but it is mental discipline of the highest kind, and will clear away many of those "cobwebs of the brain" that have been deposited by the warring philosophies of the time.

One feature of Mr. Jevons' work for which he has been most severely criticised by a certain coterie of thinkers is the scanty reverence which he exhibits for mere "facts" (so-called), regardless of their interpretation. He says in one of his most significant chapters that the study of logic has forced upon him the conviction that "serious misconceptions are entertained by some scientific men as to the logical value of our knowledge of nature;" and though he makes no attempt to establish any positive theistic conception, he performs the hardly less important service of showing negatively that atheism and materialism are no necessary results of scientific method. The final outcome of his investigation is indicated in the following striking passage from the Preface to the first edition of his work: "We have heard much of what has been aptly called the Reign of Law, and the necessity and uniformity of natural forces has been not uncommonly interpreted as involving the non-existence of an intelligent and benevolent Power, capable of interfering with the course of natural events. Fears have been expressed that the progress of scientific method must therefore result in dissipating the fondest beliefs of the human heart. Even the 'utility of religion' is seriously proposed as a subject of discussion. It seemed to be not out of place in a work on scientific method to allude to the ultimate results and limits of that method. I fear that I have very imperfectly succeeded in expressing my strong conviction that before a rigorous logical scrutiny the Reign of Law will prove to be an unverified hypothesis, the Uniformity of Nature an ambiguous expression, the certainty of our scientific inferences, to a great extent, a delusion. The value of science is, of course, very high, while the conclusions are kept well within the limits of the data on which they are founded; but it is pointed out that our experience is of the most limited character compared with what there is to learn, while our mental powers seem to fall infinitely short of the task of comprehending and explaining fully the nature of any one object. I draw the conclusion that we must interpret the results of Scientific Method in an affirmative sense only. Ours must be a truly positive philosophy, not that false negative philosophy which, building on a few material facts, presumes to assert that it has compassed the bounds of existence, while it, nevertheless, ignores the most unquestionable phenomena of the human mind and feelings."

In preparing the second edition, the author has made few alterations of importance, though he has availed himself of the suggestions furnished by correspondents and critics to revise very carefully both the language and the matter of the book. The most valuable addition is the new Preface, in which Mr. Jevons fortifies several of his positions, and makes a rejoinder to those strictures of his critics which seem to require answer. This edition commends itself to students as well by its compact and handy shape as by its greater economy of price.

THE LIFE OF J. M. W. TURNER, R.A. Founded on Letters and Papers furnished by his Friends and Fellow-Academicians. By WALTER THORNBURY. New York: *Henry Holt & Co.*

Some one has cynically but truly said that all reminiscences of Turner are unpleasant and only tend to lower the man. Genius and moral elevation are but too often divorced in our experience of human greatness, but of all the combinations of exalted faculty and ignoble baseness that found in the character of Turner was certainly one of the most curious and interesting. Of him, far more correctly than of Bacon, it might be said that he was at once the greatest and the meanest of mankind, and, in considering certain incidents of his career, it is only charitable to bear in mind that a taint of insanity was in the blood transmitted to him from his mother.

When Mr. Thornbury's work first appeared, fifteen or sixteen years ago, many of the friends and admirers of the great painter raised an indignant outcry against it, urging, in accordance with the popular doctrine of *de mortuis nil nisi bonum*, that in the splendor of the artist's genius, all merely personal frailties ought to be overlooked and forgotten; but it is now generally conceded, we believe, that it is an exceptionally honest and accurate piece of biography, inspired by cordial admiration for the artist, and by no unfriendly spirit toward the man. At any rate, be it good or

bad, it is the best we have or are likely to have; and the present revised, enlarged, and amended edition must be accepted as the standard record of Turner's life. That it has the warm approval of Mr. Ruskin is perhaps the best that could possibly be said in praise of it; and one portion of its contents for which the reader will feel especially grateful is the chapters and appendices in which Mr. Ruskin's own comments upon Turner and his works are reproduced and classified. In the present edition are incorporated sixteen previously unpublished letters of Turner to his engravers, and numerous fresh anecdotes of the great artist; while to the record of sales of his pictures in the Appendix has been added a list of those which occurred during the fourteen years between 1860 and 1874.

The volume is illustrated—we can hardly say adorned—by nine pictures facsimiled in colors from Turner's original drawings. These pictures are interesting as showing the painter's manner of seeing and interpreting nature, but only the educated eye can perceive the genius in them, which, of course, must be there.

A JOURNEY OF AN ARCHITECT IN THE NORTHWEST OF EUROPE. Translated from the French of Félix Narjoux, by John Peto. Boston: *J. R. Osgood & Co.*

M. Narjoux is an architect of sufficient eminence in France to have been associated with M. Viollet-Le-Duc in the production of the standard work on "Modern Habitations," and the present lively and suggestive volume shows that he is quite capable of independent work in a field in which M. Viollet-Le-Duc has long stood first and almost alone. His book describes a journey through Holland, North Germany, and Denmark, made in the manner of an architect, pencil in hand, taking at the same time sketches and verbal memoranda, so that the illustrations and descriptions afford each other mutual aid. "The sketches themselves," as M. Narjoux explains, "besides representing the larger public buildings erected in each country, which serve as the exponents of its greatness and of the degree of its civilization, give also, and more especially, an idea of the dwellings of private persons. They show the interiors, and the less conspicuous parts of houses which have been constructed with a view to meet the wants of the inhabitants, the local customs, and the requirements of the climate. . . . The text itself is nothing but the explanation of the plates; it shows the relations which exist between the customs of a country, the climate, the materials employed, and the dwellings erected by the inhabitants—dwellings adapted to the tastes and wishes of their proprietors, and in which they find comfort and delight." Such a record of travel is certainly novel, and the author's keen observation and literary skill have made it instructive and charming as well. In the above-quoted paragraph, justice is hardly done to the quality of the text, which often rises above mere descriptions of the accompanying drawings, and abounds in acute observations upon the multifarious things which present themselves to the view of an alert and cultivated traveller.

The print and binding of the volume are tasteful and inviting, and the two hundred and fourteen illustrations give a clear idea of the recent history and present state of architecture in Northern Europe.

SOME NEW NOVELS. FROM VARIOUS PUBLISHERS.

There are so many novels on our table equally deserving of attention that it will be more satisfactory to our readers, probably, if we give a list of the best than if we attempted a critical analysis of one or two. Aside from the charm which belongs to all the author's works, Mr. Black's "Green Pastures and Piccadilly" (New York: Harper & Bros.) will have a special interest for readers of the ECLECTIC, because it is a sequel to "The Strange Adventures of a Phaeton," which appeared in our pages three or four years ago. Few who then made the acquaintance of Bell and the German lieutenant but will be delighted to follow their subsequent adventures. Equally readable, though of a more tragic cast, is Mr. R. D. Blackmore's "Erema; or, My Father's Sin" (Harper & Bros.), the scene of which is laid partly in America; and "Carita," by Mrs. Oliphant (Harper & Bros.), possesses many of the charming qualities of that author's earlier work. "Pauline," by the author of "Mr. Smith" (Holt's "Leisure Hour Series"), is full of the delicious humor that recommended "Mr. Smith" to cultivated readers, and is written in the same pungent and epigrammatic style; and "Dita" (in the same series) is a peculiarly animated and agreeable picture of the higher English social life, by Lady Margaret Majendie. Mr. Aldrich's "Queen of Sheba" (Boston: J. R. Osgood & Co.) has already been introduced to a wide circle of readers in the pages of the *Atlantic Monthly*, but will doubtless obtain a still more numerous audience in book form; it is a deeply interesting story, characterized by firm delineation of character, vivid dramatic touches, and a refined and penetrating humor. Those who like didactic fiction will find Mr. E. P. Roe's "Knight of the Nineteenth Century" (New York: Dodd, Mead &

Co.) to their liking—it is one of the best of his works; and readers, young and old, will be amused by Mr. Charles Dudley Warner's "Being a Boy" (Boston: Osgood & Co.) This work borders very closely, we imagine, upon autobiography, and in any case is worthy of place beside Mrs. Stowe's "Oldtown Folks," as a delineation of New England character.

Some Holiday Books.

Of the holiday books which we have received, the most noteworthy is a very elegant edition of Hawthorne's "Scarlet Letter," illustrated by Mrs. Mary Hallock Foote (Boston: J. R. Osgood & Co.) The type is large and clear, the binding tasteful, and the paper that mellow creamy tint which is so grateful to the eye; but, of course, it is the illustrations that are chiefly relied upon to give the edition its *raison d'etre*. These confirm the high opinion which her previous work had given us of Mrs. Foote's artistic power, and if they are somewhat disappointing, on the whole, it is because the essential charm of Hawthorne's great romance—its weird, ghostly, almost supernatural effects—is beyond the reach of the pictorial art. Hester Prynne, Arthur Dimmesdale, Roger Chillingworth, and little Pearl, are very real personages to our imagination, yet they occupy a place apart, and any attempt to translate them into the lineaments and surroundings of every-day men and women inevitably dissipates the illusion which the great necromancer has woven around them. It is surprising rather that Mrs. Foote has so successfully avoided the danger which every artist runs in such a case of vulgarizing the author's conceptions, than that she has failed to intensify the impression they have already made upon us.

The copious imagery of Bryant's noble poem, "The Flood of Years," peculiarly adapts it for pictorial interpretation, and the Messrs. Putnam deserve credit for their prompt recognition of the fact. They have issued an edition of it in all the bravery of holiday costume, with illustrations designed and engraved by W. J. Linton; and the book will please many who care nothing for the conventional "interiors" and "figure-pieces" with which gift-books are usually embellished. Mr. Linton has caught the inspiration of the poem very successfully, and his pictures accomplish what should be the aim and test of all "illustrations"—they reflect and emphasize the varying conceptions of the author's verse. The poem itself must already be familiar to all lovers of noble poetry.

Another book, in which the illustrations diverge very widely from the ordinary, is "The Prince of Argolis," illustrated by Mr. J. Moyr Smith (New York: Henry Holt & Co.) Mr. Smith has already become known in this country by his illustrations of the Misses Kavanagh's "Pearl Fountain and other Fairy Stories," and the pictures in the present volume are distinguished by the same taste for classical and antique forms. Here, indeed, the artist has much wider scope for his genius, as the story is a tale of the old Greek fairy time, based on the semi-mythical legend of Theseus. Both author and artist carry us back to the earliest dawn of history, and the costumes, manners, customs, and architectural and other adjuncts delineated in the pictures, are based partly upon the ancient sculptures and pottery in the British Museum, and partly upon the recent discoveries of Dr. Schliemann in the Troad. The story is of a humorous or satirical cast, and is written in a remarkably easy and animated style; and the illustrations, some of which are so small as to occupy no more space than a single word of the text, alternately amuse by their grotesqueness and fascinate by their finished beauty of design and drawing. Purchasers of this volume will probably wish also to possess "The Pearl Fountain and other Fairy Stories," which contains some of Mr. Smith's best work, and of which Holt & Co. issue this season a new and cheaper edition.

Though it contains no pictures, the volume of "Single Famous Poems" (Holt & Co.) attracts by its dainty print and the general elegance of its external appearance. The work of compilation has been done by Mr. Rossiter Johnson, and the collection, which includes about one hundred and fifty pieces, is intended to embrace all those poems by which an author has become famous, irrespective of his other work. Many old favorites are here, and others which are only kept in memory by their periodical meteor-like flight through the newspapers. The volume will be found useful, because it contains many pieces that have not found their way into the ordinary collections, and consequently can never be found when wanted.

FOREIGN LITERARY NOTES.

It is proposed to issue a reprint of the Mazarin Bible. The number of copies will be limited to three hundred.

The King of Sweden and Norway is about to bring out a drama, of which the scene is laid in Upsala, and which deals with early Swedish history.

A romance, hitherto unknown, by Edgar A. Poe, has recently come into the possession of Mr. John H. Ingram. It is entitled,

'The Journal of Julius Rodman,' and is a description of an imaginary "First Passage across the Rocky Mountains of North America ever Achieved by Civilized Man."

THE Higher Education of Women prospers at Cambridge. Some new rooms have been added to Newnham Hall, and a new house has been opened, called Norwich House, which is already full. More than sixty students are thus pursuing their work under the care of the Cambridge Association. The new buildings at Girton College are also filled.

HERR KRABBE, of Stuttgart, is about to issue an unpublished collection of letters and papers by Goethe. The volume will contain the correspondence of the poet and Fritz Schlosser, between 1808 and 1832; letters to and from Goethe's parents and relatives; and finally, the poet's letters to Sophie Laroche, from 1772 to 1775. Herr Frese will edit the book.

MESSRS. VEIT & CO., of Leipzig, are now publishing an historical work by the Freiherr Ernst von der Brüggen, on the last days of Polish independence. The author has had the use of a considerable collection of hitherto unknown manuscripts. The book is entitled 'Poland's Dissolution: Historical Sketches of the Last Years of the Polish Independence (1780–1793).'

THE account of the late English Arctic expedition, that Sir George Nares was engaged upon, is to be published by Messrs. Sampson Low & Co. early next year. It will fill two volumes, and will be illustrated with maps, charts, photographs, and sketches made by members of the expedition. To the book will be added an appendix by Capt. Feilden, treating of the additions to our knowledge of natural history made by the explorers.

IN view of the Paris Exhibition of 1878, the Minister of Public Instruction is about to put into execution a long projected measure. It is to unite into one vast collection in the exhibition building, and under state management, every procurable work relating to public education in France. It is thought that this collection will prove highly interesting to delegates of foreign countries sent to investigate the French system of tuition.

THIS is the quaint and tender inscription which Mr. Ruskin placed on his father's tombstone in Croydon churchyard: "Here rests from days' well-sustained burden John James Ruskin, born in Edinburgh, May 10, 1785. He died in his home in London, March 3, 1864. He was an entirely honest merchant, and his memory is to all who keep it dear and helpful. His son, whom he loved to the uttermost, and taught to speak truth, says this of him."

THE Committee of the Palestine Exploration Fund are preparing to issue, as a first instalment of their results, a popular account of the whole work, which will be written for them by Lieut. Conder. This will not contain any portion of the scientific memoirs, which will be published later on with the map, but is intended to be a record of the method in which the survey was carried out, of the adventures and escapes of the expedition, and of those generally interesting discoveries which from time to time rewarded the explorers. An important feature will be an account of the native population, their customs, language, religion, and probable origin. Lieut. Conder also purposes to describe the great ceremonies of Easter at Jerusalem, and Christmas at Bethlehem, and to show the bearings of the collection of 200 rock-measurements obtained by him within the boundaries of Jerusalem on the question of the extent of the ancient city. A chapter will be devoted to Damascus, Hermon, and Baalbek. A list of all his proposed identifications, including Bethabara, Megiddo, Aenon, Tirzah, and other important places, will be given. And a final chapter will be devoted to the consideration of the fertility of the country, and the prospects of colonization.

SCIENCE AND ART.

CLIMATE OF NEW SOUTH WALES.—Mr. H. C. Russell, government astronomer for New South Wales, has published a descriptive, historical, and tabular account of the climate of that colony in an octavo volume of more than two hundred pages, with a map and diagrams. Although the colony is not yet a hundred years old, Mr. Russell has been unable to fill up the gaps which unfortunately exist in the record of its winds and weather; but his book is interesting and valuable nevertheless. He discusses the whole range of meteorological phenomena; he tells us about the hot winds and where they come from; about thunder and hail-storms; about lakes, floods, and tides; about droughts; about the rains, and why they vary; and about the great swarms of moths which at times come in clouds and infest miles of country. In his description of the physical characteristics of New South Wales, he gives particulars which will be quite new and perhaps surprising to many readers. 'Within the colony,' he says, 'may be found all climates, from the cold of Kiandra, where the thermometer sometimes

falls eight degrees below zero, and frost and snow hold everything in wintry bonds for months at a stretch, and where upwards of eight feet of snow sometimes falls in a single month, to the more than tropical heat and extreme dryness of our inland plains, where frost is never seen, and the thermometer in summer often for days together reads from one hundred to one hundred and sixteen degrees, and sometimes in hot winds reaches one hundred and thirty degrees, and where the average annual rainfall is only twelve to thirteen inches, and sometimes *nil* for a whole year.' Clearly there is more scope than was thought for settlers who like 'bracing weather.' In discussing the observations, Mr. Russell is of opinion that a periodicity, or a tendency to cycles of phenomena, is discoverable.

Carbolated Camphor.—In the *Bulletin de Therapeutique* M. Soulez describes the new preparation known as carbolated camphor, now becoming quite popular in European medical practice, on account of its tendency to produce diminution of reaction after severe operations, cessation or amelioration of pain and less abundant suppuration. It is made by dissolving 2.5 grams of powdered camphor in one gram of carbolic acid—a solution of the strength of nine grams in one gram of alcohol—the solution being of an oleaginous consistency, pale yellow smelling slightly of camphor, but having none of the disagreeable odor of carbolic acid. It boils at a slightly elevated temperature without decomposing, and also by the addition of concentrated alcohol, which throws down the camphor in crystals; similarly if a boiling solution of carbolated camphor is poured into cold water it instantly solidifies. It is miscible in all proportions with olive and almond oils. Chemical examination shows that the carbolic acid and camphor are not altered, and that they preserve all their properties in the solution.

Improved Sounding Apparatus.—It often happens in dark weather that the position of a ship can be ascertained only by sounding; and when near the land, the soundings should be frequent if danger is to be avoided. But as the depth can not be accurately measured without bringing the ship to a stand-still, the seaman is apt to prefer risk to loss of time; and the consequence is at times—a wreck. Sir William Thomson, to whom navigation is indebted for an important improvement in sounding apparatus, has recently proved by experiment that by adding thereto a chemical appliance the sounding may be taken while the ship is in motion. This appliance consists of a copper tube, attached to the lower end of the sounding wire, and inclosing a slender glass tube, and a small quantity of sulphate of iron. As the tube descends, the pressure of the water forces the sulphate into the glass tube: it leaves a stain on the glass; and according to the height of the stain, as indicated on a scale, such is the depth of the water. This ingenious instrument has been tried on board the *Minotaur* with satisfactory proof of its 'absolute accuracy and extreme handiness.'

Water Reservoirs in India.—How to prevent famine, will be for some time to come a very serious question in India; and while charity seeks to palliate the misery, science is trying to discover the laws of the rainfall, and to devise means of storing large supplies of water against seasons of drought. Examples are not wanting. More than a thousand years ago one of the kings of Ceylon erected a tank, Kanthalai, on a scale so enormous that, were it to be built now, it would cost a million sterling. This tank is to be repaired and made available for irrigation. In another district the tank of Kalowewa was twelve miles long and thirty miles in circumference, inclosed by embankments sixty feet in height, and was kept full by two rivers which flowed into it from the hills. In the district of Manaar the Giant's tank offers a further resource, and makes us aware of the pains taken by the natives to secure a sufficient water-supply in former ages. If India has not tanks enough for her wants, they must be built, for periodical famines are an opprobrium to Christian civilization.—*Chambers' Journal.*

Ground Air.—According to Professor Pettenkofer, the ground is full of gas, which often enters our houses and thus occasions disease. Heated houses ventilate themselves not only through the walls, but also through the ground on which the house stands. If there is any gas or other odorous substance in the surrounding ground-air, it will enter the current of this ventilation. Professor Pettenkofer has observed a case in Munich where not the least smell of gas could be detected in the street, but a great quantity of gas found its way into the ground-floor room of a house where no gas was laid on. In another case, the gas always penetrated into the best heated room, and produced an illness of its inmates, which was taken for typhoid fever. At Munich the quantity of carbonic acid in the ground is smaller at fifty-eight inches than at one hundred and fifty-six inches throughout the year, the months of June and July excepted. This large amount is exceeded at Dresden, where, a few feet under the surface, there is already as much carbonic acid as in the

worst ventilated human dwelling. From these observations the necessity of making provision for the escape of the ground-air through pipes constructed for the purpose, and not through the dwelling-house, is apparent. It is a branch of hygiene which has hitherto been too much neglected.

COLLECTIVE LIGHT AND DISTRIBUTION OF THE FIXED STARS.—Mr. J. J. Plummer has endeavored to determine the total illuminating power of the stars as compared with acknowledged photometric standards. He finds that the total illuminating power of all the stars above the horizon at one time is not less than one eightieth part of the illumination due to the full moon. In dealing with stars of lower magnitudes, he is led to the conclusion that either Argelander's *Durchmusterung* contains many stars (more than one third of the entire number) which, though rated as 9·5 magnitude, are sensibly below it, or else it must be assumed that at the average distance for stars of this magnitude a denser stratum actually exists, succeeded possibly by regions less fruitful beyond. "Having been led to the latter conclusion in opposition to preconceived ideas," he "considers that the enormously increased ratio with which the numbers of the telescopic stars are multiplied is deserving of increased interest and continued discussion." A very brief study of Mr. Proctor's chart projection of Argelander's *Durchmusterung* shows that Mr. Plummer's conclusion, though not correct for the star-sphere as a whole, corresponds with what is observed over the region of the Milky Way.

VARIETIES.

THE SULTAN'S DAY'S WORK.—A salary of £2000 a day will appear to those who have but few wants a nice competency. That is the daily wage of Abdul Hamid, the present Sultan of Turkey, and no sovereign alive earns his money harder. Out of that sum he has, moreover, to pay for his own board, fire, and candles; his lodgings alone are free, so that, considering the footing on which his establishment is placed, he must be a man of order and economy to make both ends meet with so small an income at his command. There is, indeed, no more diligent or active man in his empire than the Sultan, and it is literally true of him to say that he eats his bread in the sweat of his brow. He gives personal audience to every one that applies for it, whenever it is possible; when not, his first adjutant gives audience for him. The six hundred wives of Abdul Aziz have vanished, and Abdul Hamid finds it as much as he can do to meet the milliners' bills of a poor three dozen spouses. This scanty harem leaves him a good deal more time for devotion and State business. He leaves his apartment betimes, and bathes the prison of his soul in tepid water, after which he stretches himself full length upon a carpet and breathes a silent morning prayer. He then drinks a cup of chocolate, and proceeds immediately after to the affairs of the State. Dispatches are received and sent, reports examined and approved of, expenses consented to, decorations granted, ministers and ambassadors received, and that goes on for several hours. Towards noon a second carpet is spread at the feet of the Ruler of the Faithful, whereon he prays again, and then takes his second breakfast. After that he goes out for a ride or a drive, and when he returns he is at the disposal of his family and the inhabitants of the palace. He gives audience to his brothers and sister, listens to the report of the household officers, confers with the chief of the eunuchs on all sorts of delicate subjects and gives him his orders. The chief of the eunuchs ranks next after the Grand Vizier, and whenever a despatch containing good news from the seat of war comes in, it is he that is charged to read it to the ladies confided to his watchful care. The Imaum, or chaplain of the palace, also comes in the evening, and the Sultan prays or reads some pious book with him. Three times in the week the Sultan takes lessons on the piano from a French teacher, M. Paul Dutsap—that is, he listens to his teacher playing a few *morceaux*, but never plays a single scale himself. Later in the evening he dispatches more State business, and then an hour before midnight, accompanied only by the chief of the eunuchs, he retires to the mysterious recesses of the harem, where it is forbidden us to follow him.—*Manchester Evening News.*

BRIGANDAGE IN SICILY.—The speciality of brigandage, properly so called, as it exists in Sicily, is that those who are engaged in it follow the occupation professionally, and do so in organized bands. The latter quality distinguishes the brigand from the ordinary malefactor, such as he may be found in other communities; the former marks the distinction between him and the bulk of the Sicilian population, who live their ordinary lives in subjection to, or availing themselves of, the power of the *mafia*. The entirety of this, it is true, is founded and rests on murder in the background, never far distant, and always ready to come to the front, as has been shown. And, inasmuch as the brigand is a skilled practitioner of murder, and always ready to undertake it, it very frequently occurs that

his services are put in requisition by those who have need to recur to that *ultima ratio* of Sicilian society. In fact, nothing would more efficiently tend to confer consideration and respectability on a *capo mafioso* than the known fact that he had such social relations with a brigand chief as should promptly and surely place the latter at his orders. All brigands, therefore, are *mafiosi*, but not all *mafiosi* brigands. The brigand has no other profession, and he always recognizes the authority of his chief. He not only has no other profession, but he makes no attempt at pretending to have any other. And for this reason, despite the fact that no Sicilian will help Justice in her effort to capture and punish him, it is far more possible to compass his destruction than to root out any other form of the *mafia*. Thus, what little has been done for the repression of crime in the island has almost entirely consisted in hunting down the bands of brigands. They fight; and they occasionally, therefore, are got rid of by the expeditious process of shooting them dowa in fair fight with the troops. It is the only way in which they are satisfactorily got rid of. For if the brigand has the good fortune to fall into the hands of his good friends the police, and the courts, and the juries, he is tolerably sure of escaping conviction. And if, *par impossible*, he were convicted, he is quite sure of being allowed to return to his occupation after a longer or shorter period of seclusion, if he do not escape from prison at an earlier date. The government returns from the different establishments of "hulks" mention the case of one prisoner serving his sixth confinement for life. Five times, therefore, he has either escaped or been pardoned. And inasmuch as the sentence of imprisonment for life is not awarded save for murder (and very often not for that), five perhaps valuable lives have been sacrificed for the sake of preserving this one worthless one!—*Gentleman's Magazine.*

Tropical Forests.—A tropical forest, such as those found on the banks of the Amazons, is remarkable for its greenness, and for the comparative absence of bright-colored flowers. Here and there may be seen a tree which from topmost twig to lowest bow is one mass of blossom; but, as a rule, tropical forests have nothing to show which can equal the glory of the yellow gorse in blossom, or the flush of the heath on the hillside in September, or the sweetness of a field covered with the pale blue bells of the wild hyacinth. In the tropical forests trees crowd together, reaching up towards the light, growing to great heights before sending off a single branch, almost choked with underwood, tangled together with climbing stems, and having the ground carpeted with Lycopodiums, and encumbered with masses of dried leaves, with dropped seed and fruits. Here and there colossal trees of nearly two hundred feet high tower over the others, and "the vast dome of foliage rises above the other forest trees as a domed cathedral does above the other buildings in a city." These great trees are buttressed up by the roots, which rise ridge-like from the earth, growing gradually upwards as the tree requires greater support. Sometimes, even in these great solitary forests, very picturesque scenes occur. "A brook, flowing through a ravine in the high bank, fell in many little cascades to the broad river beneath, its margins decked out with an infinite variety of plants. Wild bananas arched over the watercourse, and the trunks of the trees in its vicinity were clothed with ferns." Sometimes, again, the forest "consisted of a most bewildering diversity of grand and beautiful trees, draped, festooned, corded, matted, and ribboned with climbing plants, woody and succulent, in endless variety. There was not much green underwood, except in places where bamboos grew; these formed impenetrable thickets of plumy foliage and thorny, jointed stems. The earth elsewhere was encumbered with rotting fruits, gigantic bean-pods, leaves, limbs, and trunks of trees; fixing the impression of its being the cemetery as well as the birthplace of the great world of vegetation overhead." Then there are the great pine-forests of Canada; the vast woods which clothe the mountain slopes of British Columbia; the great trees of the Sierra Nevada, where the redwood, the oak, the pine, the laurel, the cypress, and madrona climb up the sides of the vast hills, and where the groves of Wellingtoneas, the largest trees in the world (reaching to more than three hundred feet in height), are preserved by the benevolent care of the United States Government for the delight of all travellers.—*Sunday Magazine.*

AN OCTOBER GARDEN.

In my autumn garden I was fain
  To mourn among my scattered roses:
  Alas for that last rosebud which uncloses
To autumn's languid sun and rain,
When all the world is on the wane!
  Which has not felt the sweet constraint of June,
  Nor heard the nightingals in tune.

Broad-faced asters by my garden walk,
  You are but coarse compared with roses:
  More choice, more dear that rosebud which uncloses
Faint-scented, pinched, upon its stalk,
That least and last which cold winds balk;
  A rose it is tho' least and last of all,
  A rose to me tho' at the fall.

Christina G. Rossetti.

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(THIRTY-FOURTH YEAR.)

LITERATURE.

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